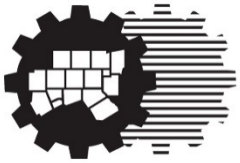
Denton Greenbelt Corridor Feasibility Study

Prepared by:



North Central Texas
Council of Governments

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EXECUTIVE SUMMARY

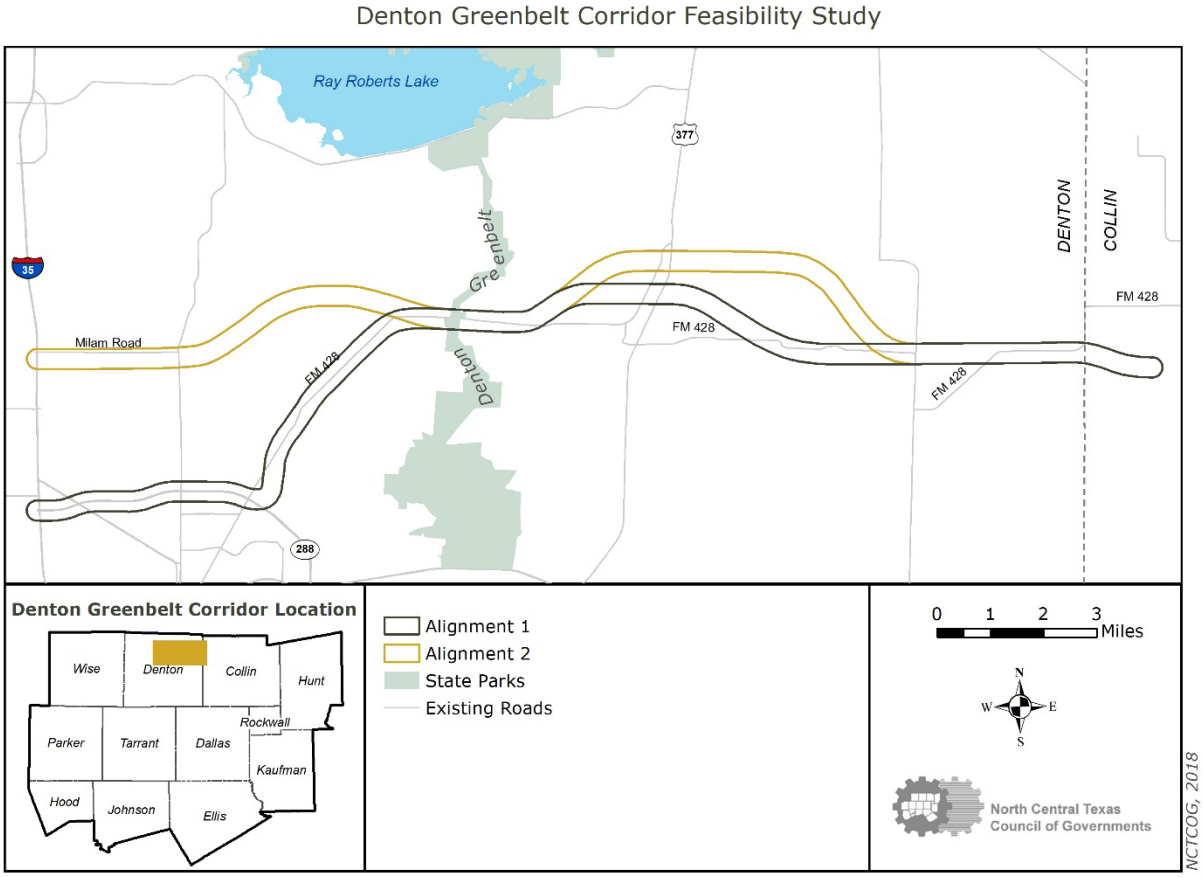
ES.1 INTRODUCTION

The North Central Texas Council of Governments (NCTCOG) conducted a formal study of the Regional Outer Loop in November 2011. In accordance with the goals of *Mobility 2045: The Metropolitan Transportation Plan for North Central Texas* (Mobility 2045), a review of the study has been conducted to evaluate the viability of a corridor across the Denton County Greenbelt, from the Collin County line at the Dallas North Tollway to IH 35. Mobility 2045 was adopted in June 2018 by the Regional Transportation Council (RTC). The Denton County Outer Loop from Dallas North Tollway to IH 35 is included in Mobility 2045. The Denton Greenbelt Corridor Feasibility Study will incorporate sustainability, environmental stewardship, and best practices as recommended by the Federal Highway Administration sustainability tool, Infrastructure Voluntary Evaluation Sustainability Tool (INVEST).

ES.1.1 Study Area

The Denton Greenbelt Corridor area is situated mostly within Denton County from the Collin County line at the Dallas North Tollway to IH 35. The study area is shown in Figure ES-1.

Figure ES-1. Study Area



The inclusion of the Denton Greenbelt Corridor and the Collin County Outer Loop in Mobility 2045 showed increased regional commitment to the project. The study area was based on the previously mentioned RTC recommended corridor, existing and future demographics,

development patterns, and major environmental constraints such as regional lakes, recreational areas, and logical termini.

ES.2 NEED AND INTENT

Historically, Texas has been one of the 10 fastest growing states in the nation. As a result of high growth rates, the demand for efficient transportation in the Dallas-Fort Worth metropolitan planning area (MPA) continues to increase. A favorable business climate, attractive tax policies, and an abundance of available land contribute to the population and employment growth of the region. Based on 2010 US Census population data, the Dallas-Fort Worth metropolitan area is the fourth most populous in the nation. The Denton Greenbelt Corridor Feasibility Study cited the following factors influencing transportation needs in the project area:

- Population growth – By 2045, substantial growth is projected in the study area and across Denton County. Denton County, with a population of 662,614 from the 2010 Census, is projected to grow to 1,346,316 by 2045.
- Employment – As population increases, employment levels are expected to increase accordingly. Denton County, with employment of 332,449 in 2010, is projected to have employment of 479,619 by 2045.
- Sustainability – NCTCOG used Federal Highway Administration's INVEST (Infrastructure Voluntary Evaluation Sustainability Tool) to identify sustainability-related content to include in corridor-scale studies. The cities of Celina and Aubrey, along with Denton County, all have future land use and economic plans. These plans detail expanded growth within the proposed project area with multiple commercial, residential, and transportation developments. The plans for each city and county include and assume the construction of the Denton Greenbelt Corridor.
- Regional travel demand – Mobility 2045 estimates that even with the implementation of planned transportation improvements, vehicle hours spent in delay would increase by 124 percent compared to 2018 mobility levels in the Dallas-Fort Worth MPA. The planned improvements would increase hourly capacity by 21 percent. Levels for vehicle hours spent in delay would increase 296 percent under the No-Build scenario.
- System linkages and intermodal connections – The current system of roadways in the project area consists of small rural county roads and Farm-to-Market roads maintained by the Texas Department of Transportation. These roadway systems were not designed to handle the expected traffic growth that will continue to occur in the project area. Additionally, the only major east-west infrastructure in Denton County is US 380, which is currently experiencing increased travel times and congestion and is located five miles south of the proposed project. It is estimated that the US 380 corridor will have severe congestion in 2045 under Mobility 2045's No-Build scenario. The Denton Greenbelt Corridor would provide a crucial east-west facility to connect these facilities and major facilities such as IH 35, US 377, and the Dallas North Tollway.

Mobility 2045 included the Denton Greenbelt Corridor as part of a long-term multimodal vision for the region to serve east-west automobile and truck traffic in northern Denton County to accommodate future growth. The Denton Greenbelt Corridor was envisioned as a potential series phased construction, adding additional lanes as traffic warranted. The intent of the Denton Greenbelt Corridor is to:

- Improve capacity, mobility, and accessibility for outlying communities and developing areas in northern Denton County by providing direct links to existing major radial highways.
- Serve northern Denton County that currently lacks major east-west facilities for inter-suburban travel

- Help manage long-term regional congestion from rapid population and employment growth and development.
- Provide the basic transportation infrastructure necessary to allow for expansion that accommodates varied travel demands or modes as warranted.
- Provide a system that integrates with current and proposed land use and promotes development outlined by the cities and Denton County.

ES.3 AFFECTED ENVIRONMENT

The existing and future conditions of social, economic, and natural environmental resources within the study area for the Denton Greenbelt Corridor were researched and documented. The best available data was gathered for the following resources: land use, farmland, demographics, community resources, cultural resources, parklands and recreational areas, visual quality, utilities, employment, development, air quality, geology, soils, water resources, biological resources, and regulated/hazardous materials.

ES.4 TRANSPORTATION SYSTEM

The existing transportation system in the Dallas-Fort Worth region is extensive. It is composed of roadways, truck facilities, railroads, airports, transit services, bicycle/pedestrian facilities, and safety and security elements. Approximately $135.4 billion in improvements and new transportation facilities are identified through the year 2045.

ES.5 INDIRECT AND CUMULATIVE IMPACTS

An indirect and cumulative impact analysis was completed for the proposed project using the Texas Department of Transportation's standards for guidance. It was determined that because economic growth is a benefit of the project, an induced growth analysis would be conducted using the metropolitan planning organization traffic model and planning documents from the cities and county. It was determined that potential indirect impacts could occur to farmland/ranch lands, open lands, and wildlife, although the impacts may not be severe. Any need for mitigation will ultimately be determined based on resource agency and stakeholder engagement as the project advances closer to the delivery phase.

A cumulative impacts study was conducted on those three resources identified in the indirect induced impact study, including the examination of the sensitive area of the Greenbelt Corridor. It was determined that no cumulative impacts are expected to occur as a result of the proposed project itself. While no mitigation is currently proposed, the project would follow all federal, state, and local laws, including potential requirements for mitigation.

ES.6 PUBLIC, AGENCY, AND TRIBAL NATION INVOLVEMENT

NCTCOG engaged resource agencies and stakeholders through 13 coordination meetings and briefings. The purpose of these meetings was to inform resource agencies and stakeholders of study efforts, obtain input, and discuss collaborative strategies for continued interaction throughout the project development and evaluation process. Table ES.1 lists the agencies, local governments, and other stakeholder groups that participated in the process. Meetings were held at key decision points throughout the study to allow constructive input and help provide direction to the process and recommendations.

Table ES.1. Participating Agencies and Governments

Resource Agencies			
Texas Parks and Wildlife Department		US Fish and Wildlife Service	
Upper Trinity Regional Water District		US Army Corps of Engineers	
Tribal Nation			
Kiowa Tribe of Oklahoma			
Muscogee (Creek) Nation Historic and Cultural Preservation Department			
Thlopthlocco Tribal Town Tribal Historic Preservation Office			
Stakeholders			
City of Denton	Greenbelt Alliance	Town of Prosper	Kimley-Horn Engineers
City of Aubrey	Venable Ranch		Allison Engineering
City of Dallas	Lake Ray Roberts		
Denton County	Equestrian Trails		
Denton County Transportation Authority	Association (LRRETA)		
	Private citizens		
	The Spinistry		

ES.7 CORRIDOR DEVELOPMENT AND EVALUATION

Previous project goals were evaluated for consistency with regional transportation goals included in Mobility 2045*;* Regional Transportation Council policies; the project needs defined in Chapter 2; and Federal Highway Administration's INVEST criteria (Appendix E) to identify sustainability-related content to include in corridor-scale studies.

Preliminary corridor paths were developed and considered based on previous studies; aerial photogrammetry; social, economic, and natural environment factors; input from stakeholders; the guiding principles and objectives; and INVEST criteria. The developed corridor paths attempted to provide connectivity (e.g., linkages to roadway, passenger rail, freight rail, and airports), avoid and minimize negative impacts to the built and natural environments, and utilize existing roadway facilities to the greatest extent possible. This would also allow for the opportunity to include multiple modes such as rail, utilities, truck lanes, bicycle, pedestrian, and equestrian.

INVEST Criteria:

- CS-01 Economic Development and Land use
- CS-02 Natural Environment
- CS-03 Scenic, Natural, or Recreational Qualities
- CS-04 Historical, Archeological, and Cultural Preservation
- CS-05 Light Pollution
- CS-06 Social Considerations
- CS-07 Context Sensitive Solutions
- CS-08 Access and Affordability
- CS-09 Safety
- CS-10 Multimodal Transportation and Health
- CS-11 Transit Facilities
- CS-12 Freight and Goods Access and Mobility
- CS-13 Travel and Demand Management
- CS-14 Air Quality and Emissions
- CS-15 Optimizing Assets
- CS-16 Operational Efficiency
- CS-17 Infrastructure Resiliency
- CS-18 Earthwork Balance

- CS-19 Linking, Planning, and National Environmental Policy Act
- CS-20 Analyses Methods

ES.8 Next Steps

The Dallas-Fort Worth Regional Travel Model for the Extended Area, a travel demand model, was used to generate 2045 travel volumes. The Denton Greenbelt Corridor is included in Mobility 2045 as a new or additional freeway capacity facility. In Mobility 2045, the Denton County Outer Loop (North) segment from IH 35 to the Dallas North Tollway is projected to carry an average daily volume of 69,300; Mobility 2045 recommends an ultimate six-lane facility (three lanes in each direction) and six-lane frontage roads (three lanes in each direction). The feasibility study refines these recommendations:

- The Denton Greenbelt Corridor is recommended to include four general purpose lanes plus occasional auxiliary lanes between IH 35 and US 377, and six general purpose lanes plus occasional auxiliary lanes between US 377 and the Dallas North Tollway (just east of the Denton/Collin County line). Through the design and engineering process, solutions should be sought to allow for six general purpose lanes between IH 35 and US 377. Construction of the ultimate facility should be considered to accommodate locally expected population growth.
- The corridor is also proposed to accommodate four frontage road lanes (two lanes in each direction) plus occasional auxiliary lanes throughout its entire length except for two sections: the Greenbelt (Elm Fork Trinity River) crossing and the US 377/Union Pacific Railroad crossing. Through the design and engineering process, grade-separated frontage roads at the railroad crossing location should be evaluated.
- Special design considerations will be required for the preservation of the Greenbelt and the historic Elm Fork Bridge across the Elm Fork Trinity River adjacent to existing FM 428. Further design and engineering solutions should be sought out to determine the feasibility of six general purpose lanes.
- Safe acceleration and deceleration lanes for freight vehicles (as proxy for horse trailers) at the entrance and exit of Ray Roberts Lake State Park trailhead at FM 248 should be evaluated.
- The 4(f) process should not be conducted concurrently with the environmental process. The Texas Parks & Wildlife Department should be provided a more finalized design before signing off on 4(f) for the Denton Greenbelt Corridor.
- To reduce visual impacts to the park, below-ground utilities should be considered.
- Wildlife underpass/es or overpass/es should be considered both east and west of the Elm Fork Trinity River to prevent animal-vehicle collisions and for access to recreational users.
- Future studies should include updates of the alignments identified in the Denton County Thoroughfare Plan (2017) and the Aubrey, Texas Master Thoroughfare Plan (2015).
- Any trails in the corridor should be designed to accommodate specific user/s such as bicyclists, pedestrians, or equestrians.
- Implementing agencies of future phases of the Denton Greenbelt Corridor should include as stakeholders all tribal nations with interest in North Central Texas, including but not limited to the Thlopthlocco Tribal Town Tribal Historic Preservation Office, the Kiowa Tribe of Oklahoma, and the Muscogee (Creek) Nation Historic and Cultural Preservation Department.
- Pedestrian surveys and on-site field investigations should be performed as the main source for cultural resource identification and locations in lieu of relying on probability models to locate cultural resources. Any survey reports shall be provided for review to tribal nations with an interest in North Central Texas.

The purpose of the Denton Greenbelt Corridor Feasibility Study was to evaluate the need and feasibility for continuation of the Collin County Outer Loop and identify environmental constraints. Based on the evaluations conducted and 2045 traffic projections, an ultimate four-lane controlled access facility with four-lane frontage roads is warranted. All data was reviewed and updated based on the latest available information and input from the public and resource agencies. These alternatives were evaluated according with local and regional transportation plans for transit, bicycle, pedestrian, and equestrian facilities. In order to fulfill federal and state funding, the project would need to follow Federal Highway Administration and Texas Department of Transportation project development guidelines and all applicable environmental regulations such as the National Environmental Policy Act.

1.0 INTRODUCTION

The North Central Texas Council of Governments initiated the formal study of a Regional Outer Loop concept in the summer of 2007. The purpose of the Regional Outer Loop Corridor Feasibility Study was to evaluate the need and feasibility for an outer loop around the Dallas-Fort Worth region, as well as identify a potential corridor(s). The Regional Outer Loop was envisioned as a potential series of independent transportation facilities that could form a 240-mile transportation corridor around the Dallas-Fort Worth region. The concept was first identified in *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area* (Mobility 2030). Mobility 2030 included the Regional Outer Loop as part of a long-term multimodal vision for the region to serve automobile and truck traffic bypassing the region and to accommodate future growth. *Mobility 2045: The Metropolitan Transportation Plan for North Central Texas* (Mobility 2045), was adopted in June 2018 by the Regional Transportation Council. The Collin County Outer Loop from Dallas North Tollway to IH 35 is included in Mobility 2045. The Denton Greenbelt Corridor will also incorporate sustainability, environmental stewardship, and best practices as recommended by the Federal Highway Administration sustainability tool, INVEST (Infrastructure Voluntary Evaluation Sustainability Tool). The Federal Highway Administration INVEST criteria include the following:

- CS-01 Economic Development and Land Use
- CS-02 Natural Environment
- CS-03 Scenic, Natural or Recreational Qualities
- CS-04 Historical, Archaeological, and Cultural Preservation
- CS-05 Light Pollution
- CS-06 Social Considerations
- CS-07 Context Sensitive Solutions
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- CS-13 Travel Demand Management
- CS-14 Air Quality and Emissions
- CS-15 Optimizing Assets
- CS-16 Operational Efficiency
- CS-17 Infrastructure Resiliency
- CS-18 Earthwork Balance

This chapter discusses the project development process and how this feasibility study fits into the process. The remaining sections in this chapter describe the project background and related previous and on-going studies.

1.1 THE PLANNING PROCESS

Figure 1-1 outlines the typical process that is followed to identify, develop, and implement transportation projects. Public and agency involvement is included in every step of the process. The need for new transportation facilities is based on current population and projected growth within the region, while balancing transportation need with land use changes and available funding (Step 1). The long-range planning process involves local, state, regional, and federal transportation officials, and provides opportunities for people throughout the region to give input and feedback. Major projects that are warranted and can be funded are added to the Metropolitan Transportation Plan (MTP). Step 2 recommends the mode (i.e., roadway, transit) for a particular transportation improvement. The inclusion of a project in the fiscally constrained

MTP (Step 2) allows planning to proceed into the feasibility, preliminary design, and environmental phase (Step 3).

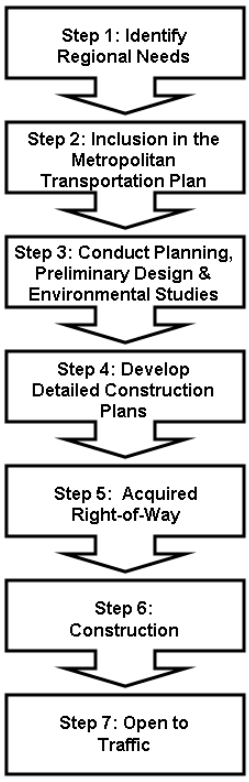
Step 3 can involve several studies, depending on the scope and length of the corridor (see Figure 1-2). For large corridors and/or those on a new location, the first level of a planning study is typically a feasibility study. The purpose of this study is to help narrow the study area and determine the transportation issues, problems to be solved, and potential solutions. This involves data collection; establishing the transportation needs and issues that need to be addressed; and developing and evaluating potential corridors based on travel demand modeling, socio-economic, and environmental data. This information is used to determine if a transportation project is feasible. If feasible, the study concludes with the identification of a study area or preferred corridor for additional study. For long corridors, the study may also recommend an implementation schedule and break the corridor into shorter sections, which may have independent utility. Independent utility means a project would be able to function on its own without further construction of an adjoining section.

These recommendations are then forwarded into the preliminary engineering and environmental studies phase. Alignment alternatives are developed within the preferred corridor. These alignments are developed at a higher level of detail for further study. More detailed examination of the social, economic, and natural environments; travel demand; and costs are some of the information developed to help assess the potential effects on the community and environment. This step also includes the development of specific mitigation strategies for potential negative effects and funding mechanisms. The analyses are documented and reviewed by federal and state agencies, decision makers, and the public to ensure the effects of the alternatives are accurately assessed and to help make an informed choice by assessing the effects of the No Build and Build alternatives. For large projects, it may take 5 to 10 years of alternative development and evaluation, public and agency involvement, and environmental study to select a preferred alignment.

Once an alignment is environmentally approved, the next step of the project is to develop detailed construction plans. During this step, the implementing agency, funding sources, staging, and construction schedule are determined. Any needed right-of-way would be acquired before construction begins. Most large projects are constructed and opened to traffic in stages because of funding availability and the need to minimize traffic impacts during construction.

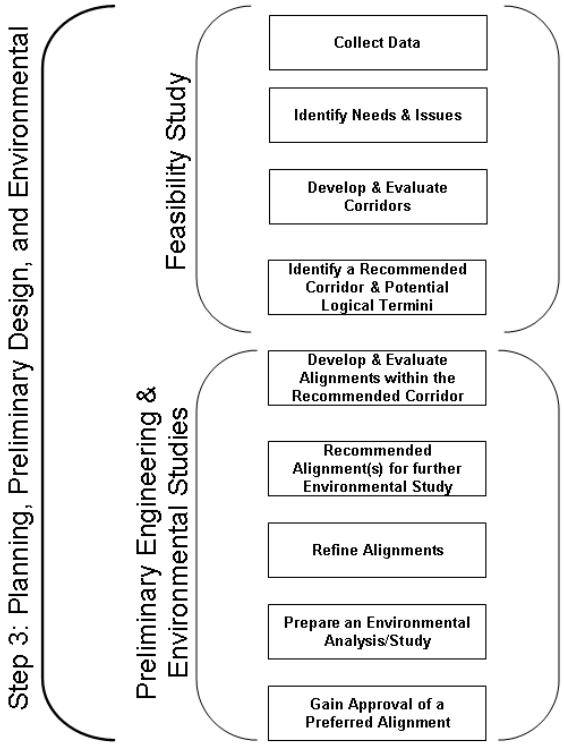
The Regional Outer Loop Corridor Feasibility Study was part of Step 3 (see Figures 1-1 and 1-2). The purpose of this corridor feasibility study was to evaluate the need and feasibility for an outer loop, as well as identify a potential corridor for future study; it did not include the development of alignments within a corridor. In the context of the Regional Outer Loop Feasibility Study, a corridor was a defined width of approximately one mile. In comparison, the typical right-of-way width needed for a major roadway is approximately 450 to 600 feet. A corridor width of one mile merely helped to define the future study area and allows for flexibility in the development of alignment alternatives to minimize negative social, economic, and environmental effects. Future preliminary engineering and environmental studies would establish the specific alignment and right-of-way needs.

Figure 1-1. Typical Project Development Process



- Step 1: Based on current and forecast demographics
- Step 2: Develop MTP and recommend mode based on regional needs
- Step 3: Develop and evaluate corridors and alignment alternatives
  - Complete environmental and preliminary engineering
  - Obtain environmental approval(s)
- Step 4: Develop construction and operation plans
  - Determine implementing agency and funding sources
  - Determine project staging plan
- Step 5: Acquired and/or preserve right-of-way to expedite future construction efforts
- Step 6: Construction
  - Staged construction – may take up to 10 to 20 years to construct the complete facility
  - Section priority based on travel demand
- Step 7: Open for Operation

Figure 1-2. Step 3 of the Planning Process



1.2 REGIONAL PLANNING CONTEXT

The North Central Texas Council of Governments serves as the Metropolitan Panning Organization (MPO) for a 12-county metropolitan planning area centered on Dallas and Fort Worth. The metropolitan planning area includes Collin, Dallas, Denton, Ellis, Hood, Hunt, Johnson, Kaufman, Parker, Rockwall, Tarrant, and Wise counties. Since the early 1970s, MPOs have had the responsibility of developing and maintaining a MTP. The MTP is federally mandated, which must be updated to maintain a 20-year planning horizon. It identifies transportation needs; guides federal, state, and local transportation expenditures; and is the basis for project-specific studies.

A series of federal transportation acts have specifically addressed and modified the role of the MPO. The Intermodal Surface Transportation Efficiency Act of 1991 strengthened the role of the MTP by making it the central mechanism for the decision-making process regarding transportation investments. The passage of the Transportation Equity Act for the 21st Century in 1998 continued this emphasis. The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) was signed into law on August 10, 2005. SAFETEA-LU addresses the challenges facing our transportation system such as improving safety, reducing traffic congestion, improving efficiency in freight movement, increasing intermodal connectivity, and protecting the environment. The SAFETEA-LU metropolitan planning regulations require transportation plans to be fiscally constrained by being based on reasonable assumptions that the funding is available to build what is contained in the multi-year plan. Both the federal transportation acts and the Clean Air Act Amendments of 1990 impose conformity requirements on the long-range transportation plan for urbanized areas.

The development of the current MTP, Mobility 2045, was guided by nine goals related to mobility, quality of life, system sustainability, and implementation (see Table 1.1). The goals adopted as part of Mobility 2045 represent the Dallas-Fort Worth regional commitment to a comprehensive, cooperative, and continuous transportation planning process for a balanced transportation system by recognizing the evolving transportation and air quality needs of the region.

Table 1.1. Mobility 2045 Goals

Mobility	Quality of Life	System Sustainability	Implementation
• Improving the availability of transportation options for people and goods. • Supporting travel efficiency measures and system enhancements targeted at congestion reduction and management. • Assuring all communities are provided access to the regional transportation system and the planning process.	• Preserving and enhancing the natural environment, improving air quality, and promoting active lifestyles. • Encouraging livable communities which support sustainability and economic vitality.	• Ensuring adequate maintenance and enhancing the safety and reliability of the existing transportation system. • Pursuing long-term sustainable revenue sources to address regional transportation system needs.	• Providing for timely project planning and implementation. • Developing cost-effective projects and programs aimed at reducing the costs associated with constructing, operating, and maintaining the regional transportation system.

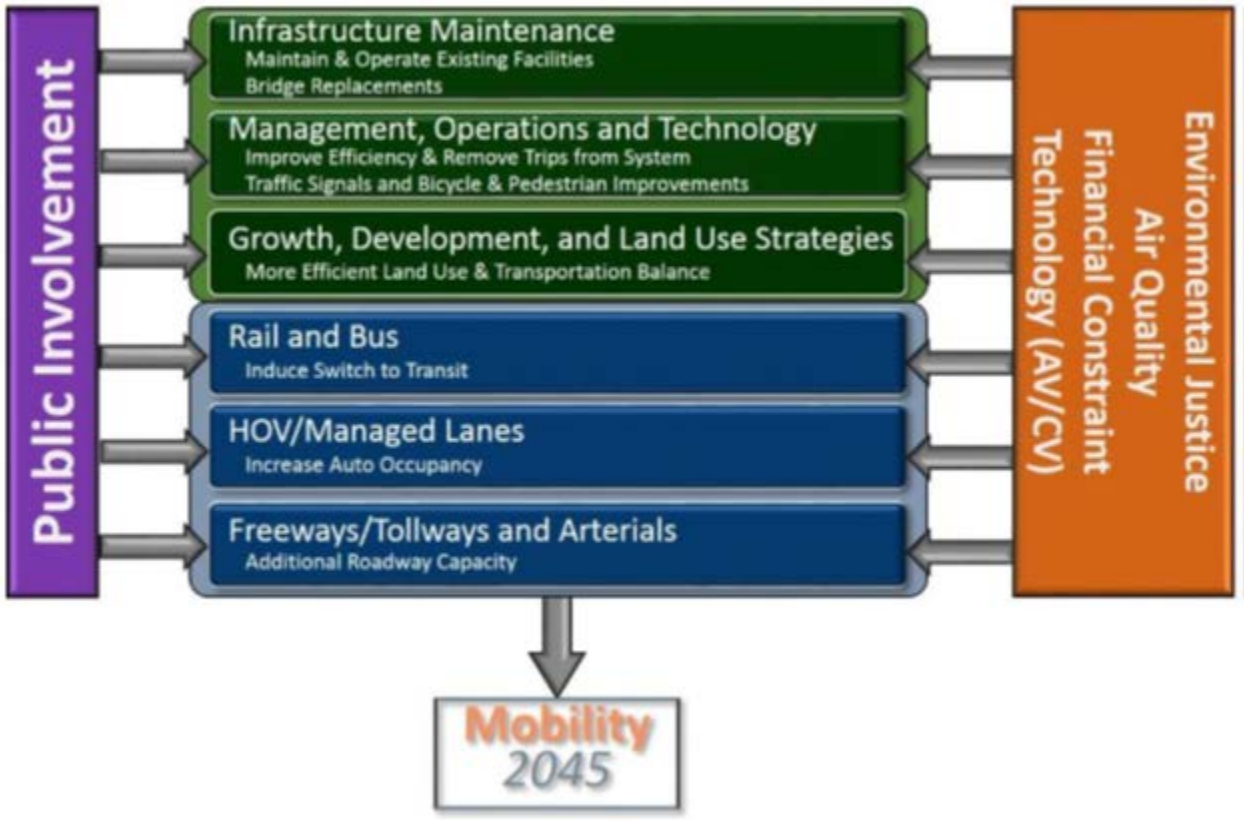
Source: Mobility 2045, June 2018

The Dallas-Fort Worth region is designated as a nonattainment area for eight-hour ozone by the Environmental Protection Agency. The Clean Air Act Amendments of 1990 require transportation plans for all nonattainment areas to be in conformity with the State Implementation Plan for air quality to demonstrate that projects in the MTP meet air quality goals. In accordance with the metropolitan planning regulations, the MTP must include a congestion management process to address congestion systematically. The congestion management process is a systematic approach, collaboratively developed and implemented throughout a metropolitan region, which provides for the safe and effective management and operation of new and existing transportation facilities through the use of demand reduction and operational management strategies.

Mobility 2045 was developed amidst growing concerns for increasing congestion, reduced air quality in the Dallas-Fort Worth region, and the lack of financial resources to fund many desired transportation projects and programs. To maximize available funds, a prioritization process was followed to maximize the existing transportation system, then invest strategically in infrastructure improvements. To maximize available funds, a prioritization process was followed to maximize the existing transportation system, then invest strategically in infrastructure improvements (see Figure 1-3). This is done by first investing in the maintenance of the existing infrastructure and improving the management and operations of existing facilities; removing trips from the system; and improving land use/transportation connections. Investments are then made in strategic infrastructure to induce a switch to transit and increase auto occupancy. Only after maximizing the operational capacity of the existing transportation system are additional capacity and/or new location projects such as tax-supported highways or tolled facilities considered.

Transportation system performance information was based on the Dallas-Fort Worth Regional Travel Model for the Extended Area. This information helped guide the development of system alternatives and indicated the impact of various improvements. The improvements recommended in Mobility 2045 include regional congestion management strategies, bicycle and pedestrian facilities, managed/high-occupancy vehicle lanes, light/commuter rail and bus transit improvements, intelligent transportation system technology, freeways and toll roads, and improvements to the regional arterial and local thoroughfare system such as intersection improvements and signal timing.

Figure 1-3. Prioritization of Improvements



Source: Mobility 2045, Exhibit 1.0-2, June 2018

The estimated cost of the projects in Mobility 2045 is $135.4 billion (see Table 1.2). The primary funding sources for the plan include federal and state motor fuel tax, local roadway monies, local transit taxes, and innovative financing. However, the needs of the region have outpaced the projected funding sources. Mobility 2045 estimates that the North Central Texas region would need approximately $390 billion to eliminate the worst levels of congestion. Mobility 2045 identifies approximately $135.4 billion in resources to fund transportation improvements in the region through the year 2045.

Table 1.2. Identified Funding Needs for the Dallas-Fort Worth Region

Metropolitan Transportation System Components	Mobility 2030, 2009 Amendment (Billions)	Mobility 2035 (Billions)	Mobility 2040 (Billions)	Mobility 2045 (Billions)
Infrastructure Maintenance	$36.2	$27.3	$37.4	$38.7
Management and Operations	$3.1	$4.8	$7.2	$9.6
Growth, Development, and Land Use Strategies	$2.1	$3.9	$3.6	$3.2
Public Transportation	$24.3	$18.9	$27.2	$33.4
Roadway System	$79.8	$46.2	$43.4	$50.6
Total	**$145.5**	**$101.1**	**$118.9**	**$135.4**

Source: NCTCOG, July 2018

1.3 STUDY CONTEXT AND PREVIOUS STUDIES

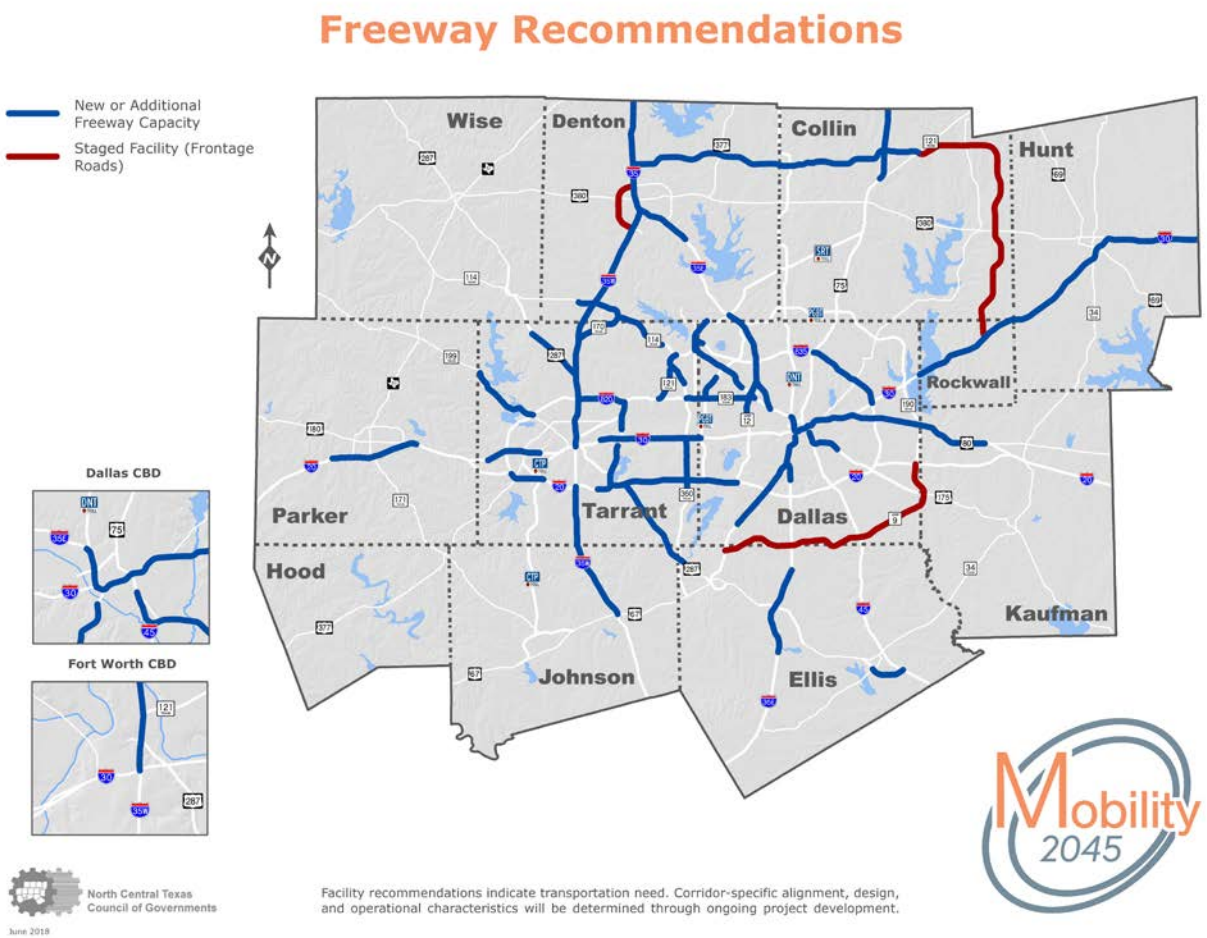
The Regional Outer Loop Corridor Feasibility Study (November 2011) identified an east-west corridor in Denton County for ongoing studies. Denton County adjoins Dallas, Tarrant, Wise, Cooke, Grayson, and Collin counties. The study limits for the Denton County Greenbelt are from IH 35 in the city of Denton to the Dallas North Tollway (DNT) in Aubrey.

Denton County's north-south mobility includes IH 35E, IH 35W, and DNT. IH 35E south of Denton is under construction to provide a six-lane freeway plus managed lanes. The DNT has a planned expansion northward into Grayson County, generally along the western edge of Collin County/eastern edge of Denton County.

The east-west mobility in Denton County is provided by the Sam Rayburn Tollway (SH 121) and US 380. US Highway 380 extends across IH 35, DNT, and US 75. There are significant constraints to east-west mobility due to the location of Lake Lewisville and Lake Ray Roberts.

The Collin County Regional Loop from DNT to US 75 is currently funded and in the development phase. The Denton County Greenbelt Corridor is a critically important access point with DNT and other established roadway corridors.

Figure 1-4. Mobility 2045: The Metropolitan Transportation Plan Freeway Recommendations Map

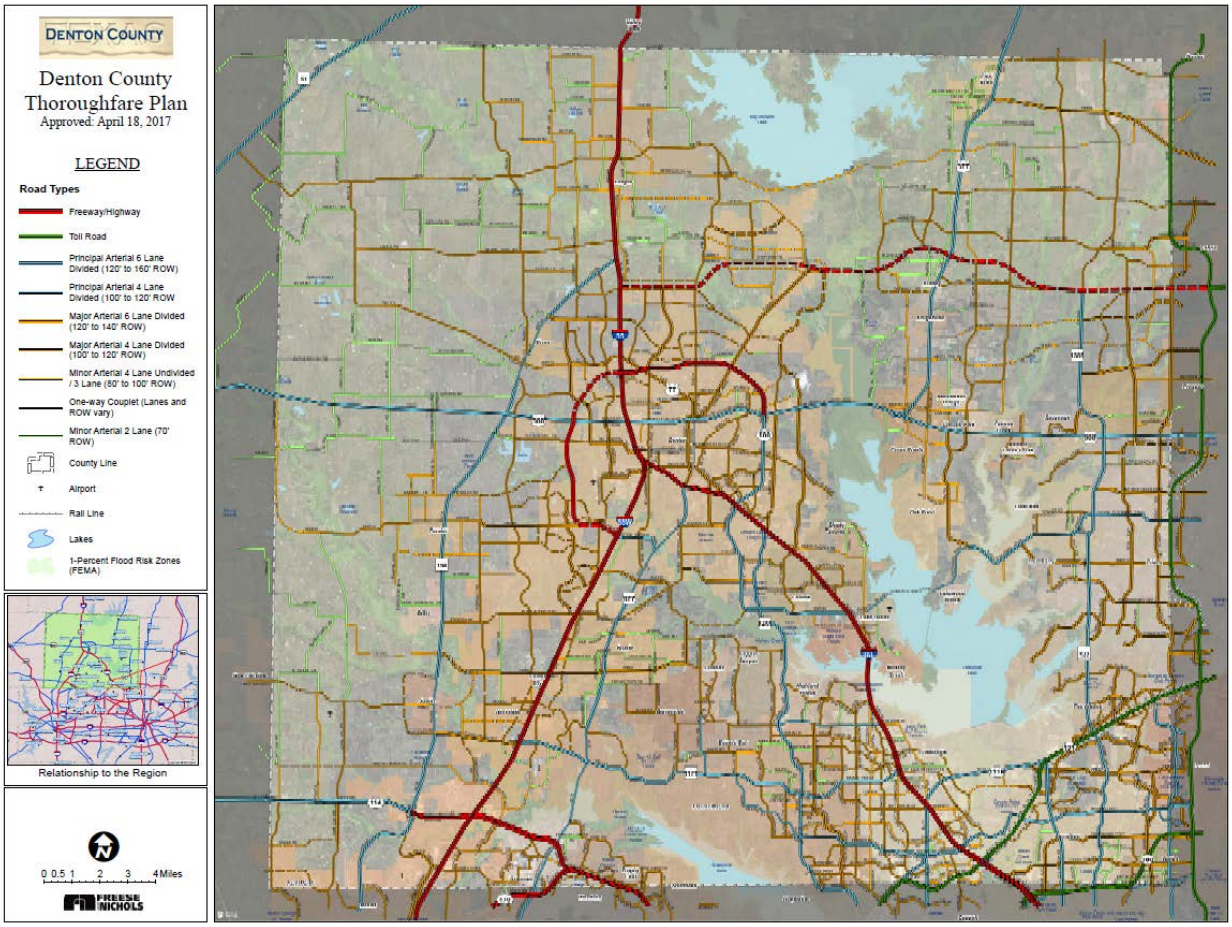


1.4 DENTON COUNTY

The Denton County Thoroughfare Plan is the official transportation planning document adopted by the Denton County Commissioners Court in April 2017 (Figure 1-5). The purpose of the document is to provide a guideline for present and future transportation needs for the county and a tool for implementation. It does not contain a recommendation for a Regional Outer Loop or any new limited-access freeway or toll road facility. Recognizing that the current document had become greatly outdated because of rapid growth, the Denton County Commissioners Court authorized the development of an update to the plan.

Numerous individual facility and system-wide alternatives were developed, modeled, and analyzed between 2004 and 2007. To date, no formal recommendation resulting from this evaluation has been identified or adopted by the Denton County Commissioners Court. However, within the final draft prepared in 2007, the county requested the inclusion of a high-speed, east-west oriented six-lane arterial between the Collin County line near Celina and FM 156 north of Krum. The facility was generally aligned along the existing FM 428 corridor with a northern bypass around the city of Aubrey. West of the Trinity River Greenbelt, the facility was generally routed along the FM 3163 corridor, travelling across IH 35 and connecting to FM 156 just south of the Kansas City Southern Railroad connection to the BNSF Railway line. The new roadway was touted as the last remaining opportunity for a major high-capacity east-west facility in Denton County between US 380 and Lake Ray Roberts because FM 455 to the north travels across the Ray Roberts Dam and cannot be feasibly widened beyond its current two-lane capacity. In addition, Denton County officials were aware in 2007 of the planning activities underway to the east for the Collin County Outer Loop and this roadway was identified as a potential connecting facility or possible extension of that corridor.

Figure 1-5. Denton County Thoroughfare Plan (2017)



1.5 COLLIN COUNTY OUTER LOOP STUDY

The Collin County Mobility Plan is the officially adopted document by the Collin County Commissioners Court, which identifies the present and future transportation needs for Collin County. The *Collin County Mobility Plan-2002 Update* was the first plan to include the Collin County Outer Loop. This plan, as well as the subsequent 2004 update, identified the Collin County Outer Loop as a "Multimodal Transportation Corridor Preservation." Figure 1-6 illustrates the 2014 Update of the Collin County Thoroughfare Plan, stretching from the Denton County line between the cities of Celina and Prosper, traveling north of the city of Mellissa, then turning south along the east side of Lake Lavon down toward the Rockwall County line.

In January 2009, the Collin County Commissioner Court created the Collin County Toll Road Authority. Responding to continued strong demographic growth, as well as the lack of sufficient state or federal funds, the county saw an opportunity through the Collin County Toll Road Authority and recent state legislation (Texas Senate Bill 792) to construct segments of the Collin County Loop. In addition, an inter-local agreement was reached in March 2011 by the Collin County Toll Road Authority and the North Texas Tollway Authority allowing the collaborative advancement of planning for the Collin County Outer Loop. As part of the agreement, the Collin County Toll Road Authority and the North Texas Tollway Authority will form and maintain an advisory group consisting of the Texas Department of Transportation, the North Central Texas Council of Governments, and other appropriate parties.

The approved Collin County Outer Loop locally preferred alignment was formally incorporated into the *Collin County Mobility Study-2007 Update* thoroughfare plan recommendations and the document was officially adopted by the Collin County Commissioners Court in December 2007. The Collin County Outer Loop locally preferred alignment was classified in the thoroughfare plan recommendations as a tollway with the recognition that local revenues alone would be insufficient to complete final engineering, obtain environmental approval, acquire right-of-way, and construct the ultimate facility prior to the year 2030. The *Collin County Mobility Study-2007 Update* also stated that the design concept and scope of its Outer Loop recommendation was consistent with the North Central Texas Council of Governments' proposal for a Regional Outer Loop outlined in Mobility 2030.

As of December 2017, design is ongoing for the construction of a two-lane service road from DNT to just east of SH 289. Design is also in progress for Segment 3 from the Denton/Collin County line to US 75 (Figure 1-7).

Figure 1-6. Collin County Mobility Study – Thoroughfare Plan (May 2016)

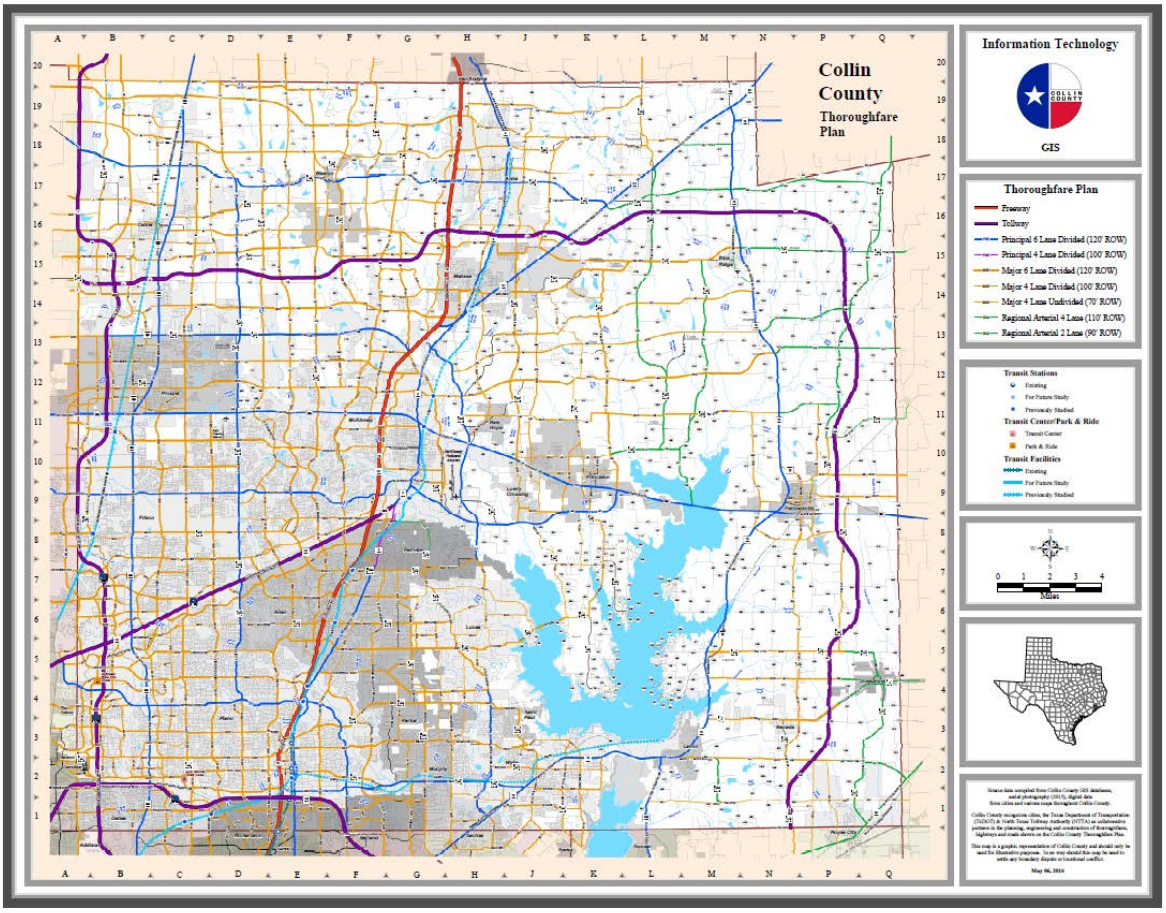
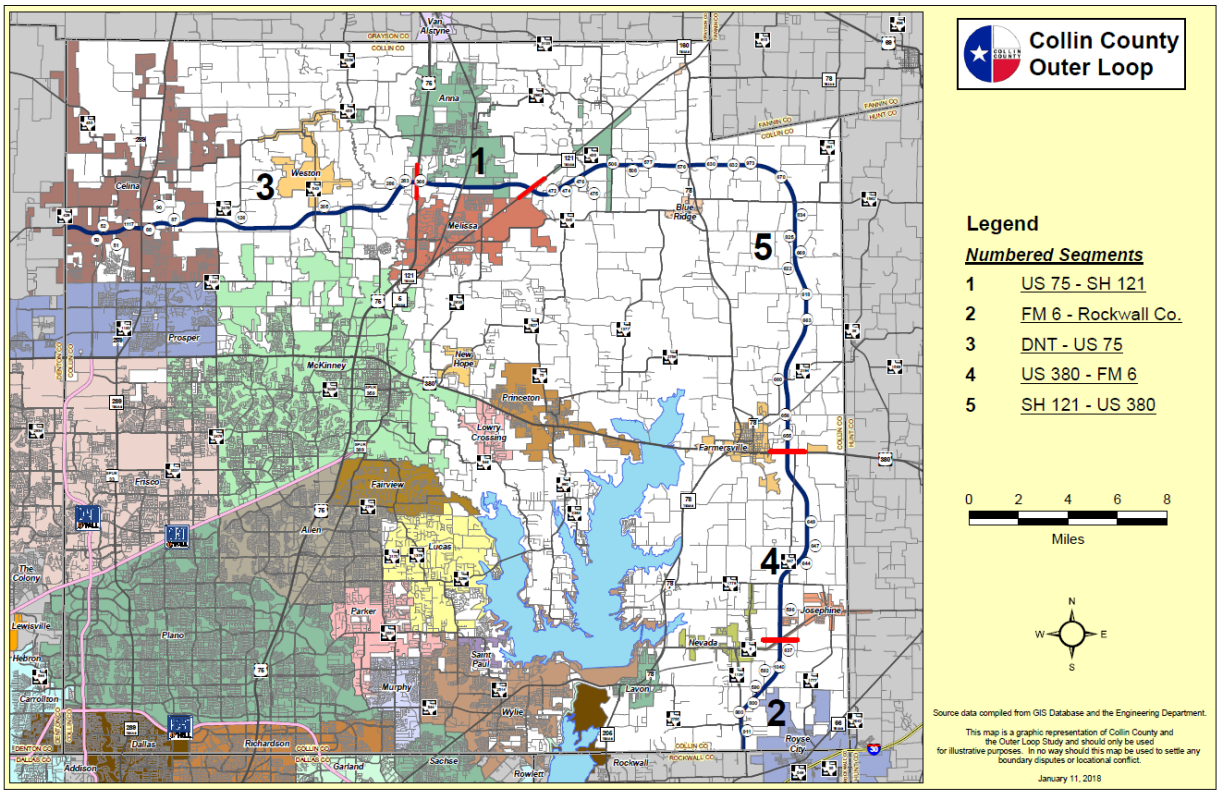


Figure 1-7. Collin County Outer Loop



1.6 SUMMARY

The need for a circumferential roadway around the Dallas metropolitan area was first identified in the *1957 Thoroughfare Report* of the Dallas Area Master Plan Committee. The Regional Outer Loop is an outgrowth of substantial and long-standing components of the regional long-range transportation plan. Portions of the Regional Outer Loop have been included in each of the 12 regional transportation plans developed since 1974. The inclusion of the Denton Greenbelt Corridor and the Collin County Regional Outer Loop in Mobility 2045 showed increased regional commitment to the project. Various municipalities and agencies such as the North Central Texas Council of Governments and the Texas Department of Transportation have demonstrated support for the project by including outer loop sections in their local and regional thoroughfare plans, or by referring to the outer loop during their planning efforts.

2.0 NEED AND INTENT

This chapter discusses the potential transportation needs and intent of the Denton Greenbelt Corridor. This chapter also describes the study area and subareas established for the project.

2.1 NEED FOR THE DENTON GREENBELT CORRIDOR

This section discusses potential regional transportation needs based on population and employment growth, regional transportation demand, and system linkages in the study area and the Dallas-Fort Worth region.

2.1.1 Growth

Historically, Texas has been one of the 10 fastest growing states in the nation. According to the US Census Bureau, Texas added 4.3 million persons between 2000 and 2010, a 20.6 percent increase in population. By comparison, the US population grew by 27.3 million persons between 2000 and 2010, an increase of 9.7 percent. As a result of these high growth rates, the demand for efficient transportation in the Dallas-Fort Worth metropolitan area continues to increase. A favorable business climate, attractive tax policies, and an abundance of available land also contribute to the population and employment growth of the region. Based on 2010 US Census population estimates, the Dallas-Fort Worth metropolitan area is the fourth most populous in the nation.

2.1.2 Future Growth based on Historical Trends

In 2010, the Dallas-Fort Worth urban area grew to 6,417,724 persons, a 23 percent increase in population since the 2000 Census. Table 2.1 indicates the North Central Texas Council of Governments (NCTCOG) regional projections for population and employment from 2018 through 2045 for the Dallas-Fort Worth metropolitan planning area (MPA). The MPA includes 12 counties: Collin, Dallas, Denton, Ellis, Hood, Hunt, Johnson, Kaufman, Parker, Rockwall, Tarrant, and Wise. Based on the 2010 US Census, the Dallas-Fort Worth MPA increased in population by about 1.2 million people from 2000 to 2010.

Table 2.1. North Central Texas Regional Demographics

Year	Population	% Change	Employment	% Change
2000 Census[1]	5,197,317		2,570,771	
2010 Census[1]	6,417,724	23%	3,035,742	18%
2018[2]	7,429,723	16%	4,793,363	18%
2028[2]	8,722,529	17%	5,455,956	14%
2037[2]	10,188,220	17%	6,382,301	17%
2045[2]	11,246,531	10%	7,024,227	10%

Source: [1]US Census Bureau (Decennial Census or American Community Survey), [2]NCTCOG Demographic Forecast Information, September 2018

Substantial growth is occurring in the study area and across Denton County. Denton County, with a 2010 population of 662,614 according to the US Census, is projected to grow to 1,346,316 by 2045. Additionally, Denton County will have a population density of 1,405 per square mile in 2045, which is greater than the MPA at 1,191 in 2045.

The project crosses through three cities: Celina, Aubrey, and Denton. Table 2.2 indicates the growth for these cities in the project area through 2040, the furthest year for which this data is available for cities. This shows the substantial growth in these cities compared with the entire MPA average of 1.9 percent growth per year from 2018 to 2045.

Table 2.2. Population Growth

City	Population		Estimated 2018 Population[2]	% Change per year	Projected 2040 Population[3]	% Change per year
	2000[1]	2010[1]				
Celina	1,861	6,028	13,090	14.6	89,000	26.4
Aubrey	1,500	2,595	4,040	7.0	7,349	3.7
Denton	80,537	113,383	130,990	2.0	268,780	4.8

Source: [1]US Census Bureau, [2]NCTCOG Population Estimates, [3]Texas Water Development Board, September 2018

As population increases, employment levels are expected to increase accordingly. In the MPA, employment was 3,035,742 in 2010 (US Census Bureau). Employment for the region is protected to grow to 7,024,227 in 2045 (NCTCOG demographic forecast). In Denton County, employment was 332,449 in 2010 (US Census Bureau). Employment for Denton County is projected to grow to 479,619 (NCTCOG demographic forecast) in the same time period.

NCTCOG used Federal Highway Administration's INVEST (Infrastructure Voluntary Evaluation Sustainability Tool) to identify sustainability-related content to include in corridor-scale studies. INVEST criteria CS-1.1 and CS-1.2 discuss identifying how transportation needs meet economic development and land use and engaging those agencies responsible. The cities of Celina and Aubrey, along with Denton County, have future land use, zoning, or comprehensive plans. These plans detail expanded growth within the proposed project area with multiple developments with commercial, residential, and transportation. The plans for each city and county include and assume the construction of the Denton Greenbelt Corridor. NCTCOG has met with each of these stakeholders to provide input into this project. Public and stakeholder coordination is discussed in detail in Chapter 6.

As Denton County continues to attract new industry and businesses, and established businesses relocate further from the urban core, the associated increases in population and employment will create a strain on existing transportation systems. Trends derived through analysis of previous demographic growth include increased automobile ownership, more single-occupant travel, increased suburbanization, and increased vehicle miles of travel in the region (regional travel). Given the availability of undeveloped land and the absence of an east-west roadway network in the project area, the existing suburbanization is anticipated to create severe mobility implications and the need for additional transportation linkages.

2.1.3 Travel Demand

Traditionally, mobility improvements for the metropolitan area have focused on improving travel time and reducing traffic congestion along the major freeway corridors. The majority of industrial and commercial developments have historically been located around the major freeway facilities. Most of the peak-hour travel demand was observed to originate from commuters in suburban communities located outside these major freeway corridors traveling to and from their respective places of employment. Industrial and commercial developments have now expanded beyond the major freeways into the suburban communities, causing a dramatic change in travel patterns for these areas. Increasing development of the industrial and commercial facilities has positively affected the growth of the economy for these communities, as well as generated rapidly increasing population growth.

Not only have population and travel increased, but the nature of travel has changed in ways that contribute to greater traffic congestion. The changes in land use associated with suburbanization have an effect on the characteristics of travel. Rather than the suburb-to-central

city commute of the past, current commuting patterns are more widely diffused, as inter- and intra-suburban travel has increased. Due to the rapid pace at which growth has occurred, and is projected to continue, limited funding seriously constrains the ability to solve ground transportation issues in the region.

Section 1.2 discusses the process and development of the Metropolitan Transportation Plan. *Mobility 2045: The Metropolitan Transportation Plan for North Central Texas* (Mobility 2045) is the current fiscally constrained Metropolitan Transportation Plan for the Dallas-Fort Worth area. It presents a system of transportation improvements needed to maintain mobility in the Dallas-Fort Worth metropolitan area over the next 25 plus years and serves as a guide for the expenditure of state and federal funds for the region. Its development was coordinated among the public, local governments, transit authorities, the Texas Department of Transportation, Federal Highway Administration, and Federal Transit Administration. Regional transportation projects selected through the process of forecasting future travel demand, evaluating system alternatives, and selecting those options which best meet the mobility needs of the region are included in the plan. It also serves as a guide for the phased implementation of multimodal transportation improvements, policies, and programs through the year 2045.

A major emphasis of Mobility 2045 is management of the regional transportation system. Mobility 2045 focuses on cost-effective improvements, identifying additional and/or alternative funding sources for needed transportation improvements, and a more aggressive strategy (or strategies) to manage the regional transportation system. The potential transportation projects considered for inclusion in Mobility 2045 were evaluated against a standard or warrant. Various improvements/modes including the congestion management process, bicycle and pedestrian facilities, rail facilities, and managed lane facilities were investigated prior to determining the need for additional roadway capacity improvements. The warrants were based on minimum and maximum traffic volumes as a function of facility type, number of lanes, and area type (e.g., urban, suburban, rural).

As shown in Table 2.3, Mobility 2045 estimates that even with the implementation of planned transportation improvements, vehicle hours spent in delay would increase by 124 percent compared to 2018 mobility levels in the Dallas-Fort Worth MPA. The planned improvements would increase hourly capacity by 21 percent. Levels for vehicle hours spent in delay would increase 296 percent under the No-Build scenario.

Table 2.3. Mobility 2045 Regional Performance Measures

Regional Performance Measure	2018	2045	No Build
Population	7,429,723	11,246,531	11,246,531
Employment	4,793,363	7,024,227	7,024,227
Vehicle Miles of Travel	212,248,504	331,319,572	332,376,920
Hourly Capacity (Miles)	44,779,653	54,331,489	44,284,576
Vehicle Hours Spent in Delay (Daily)	1,682,269	3,773,455	6,658,531
Increase in Travel Time Due to Congestion	40.98%	59.12%	101.77%
Annual Cost of Congestion (Billions)	$12.1	$27.2	$47.9

Source: Mobility 2045, Exhibit 8.16, May 2018

Figure 2-1 illustrates the congestion levels during the peak hour under 2018 conditions. Figure 2-2 illustrates the congestion levels during the peak hour under 2045 conditions. The congestion level for 2045 with the Mobility 2045-recommended improvements includes the Denton

Greenbelt Corridor. Figure 2-3 shows the congestion levels during peak hour in the Dallas-Fort Worth MPA under the No-Build scenario where no transportation improvements are built beyond the programmed commitments in the *2019-2022 Transportation Improvement Program*.

Figure 2-1. 2018 Peak-Period Congestion Levels

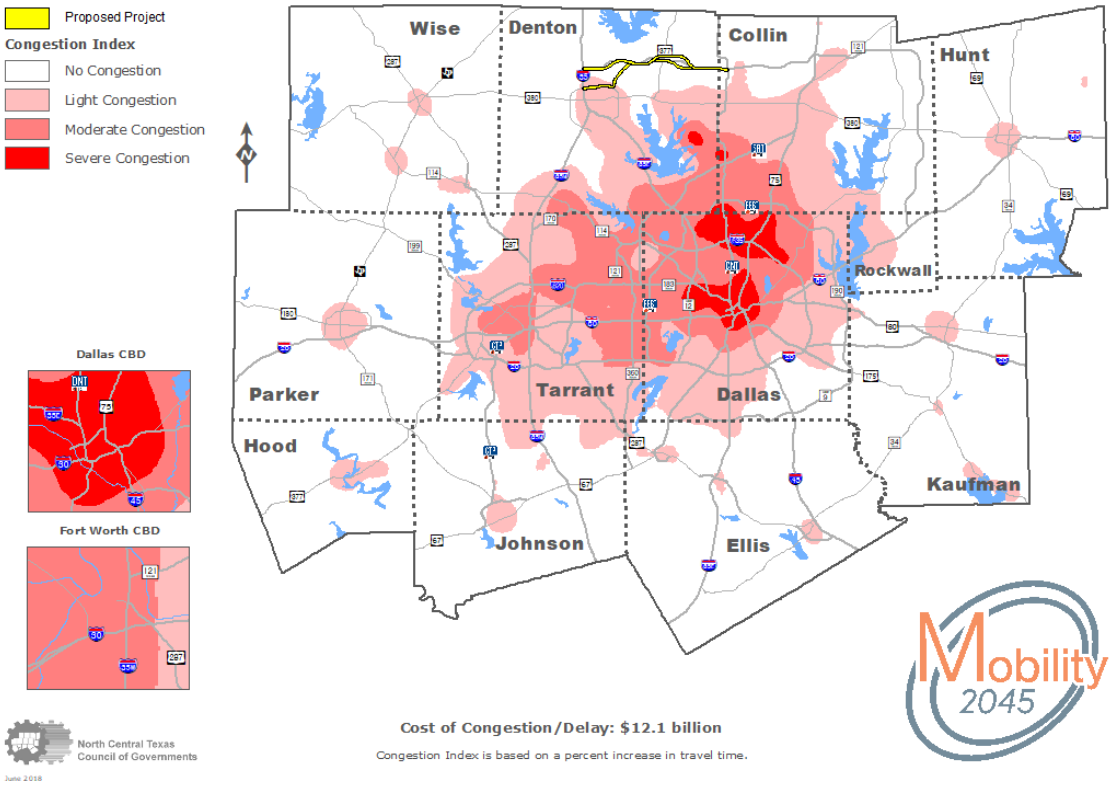


Figure 2-2. 2045 Peak-Period Level of Congestion (Build)

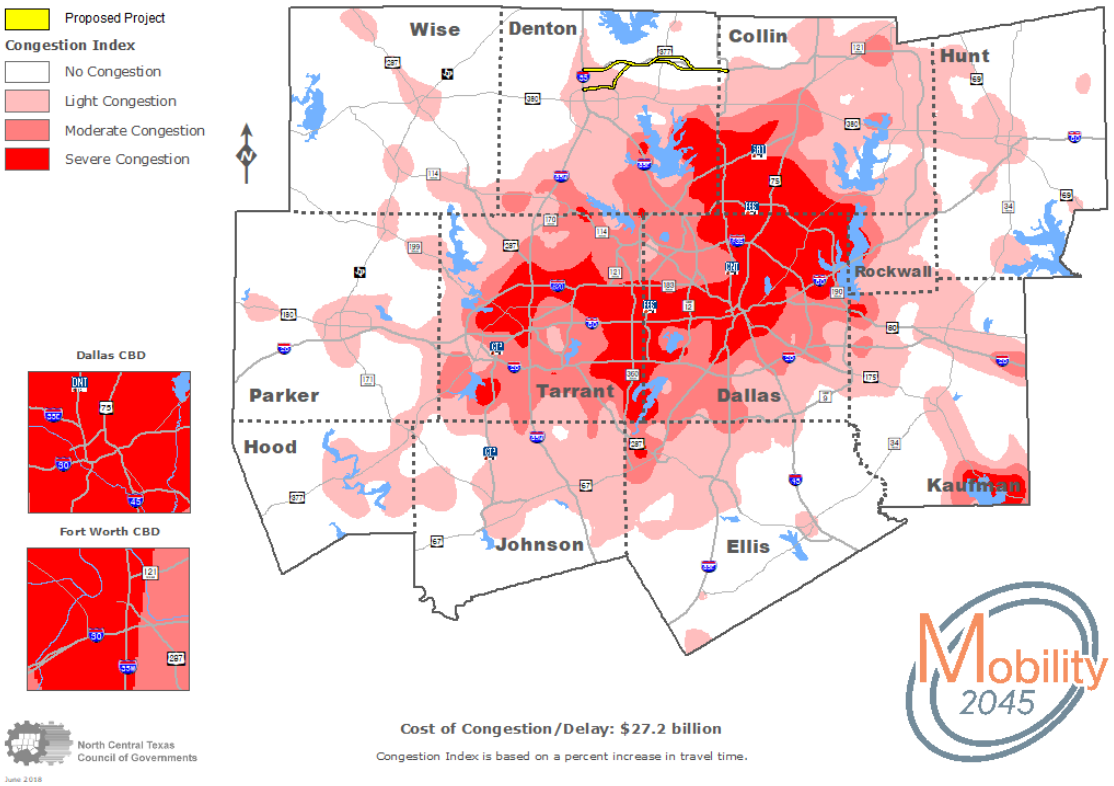
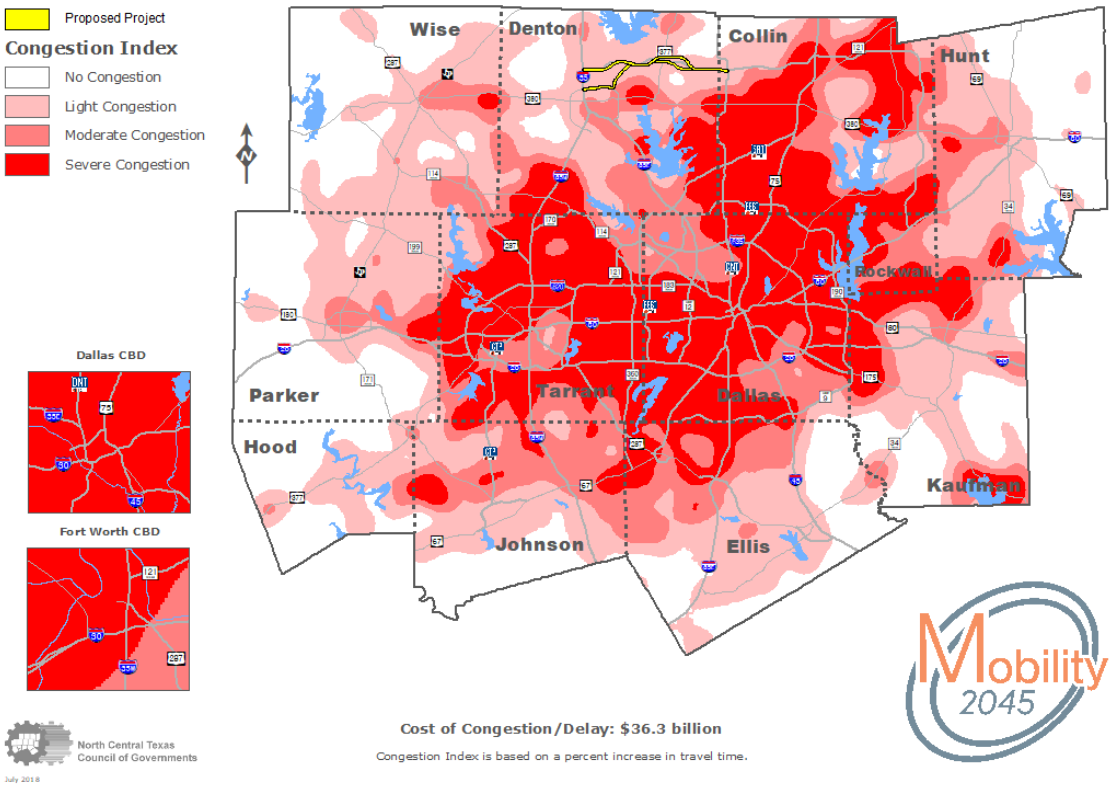


Figure 2-3. 2045 Peak-Period Congestion with No Improvements



The congestion levels continue to increase from the existing condition. Under the No-Build option for Mobility 2045, the proposed project would be in light and moderate congestion. The full build for Mobility 2045, including this proposed project, would reduce the area to light congestion near the city of Denton and no congestion for the remainder of the project area.

System Linkages

Denton County has, and continues, to experience substantial growth. As the growth continues in the northern portion of the MPA, demand for roadways and linkages increase. The current system of roadways in the project area consist of small rural county roads and Farm-to-Market roads maintained by the Texas Department of Transportation. These roadway systems were not designed to handle the expected traffic growth that will continue to occur in the project area. Additionally, the only major east-west infrastructure in Denton County is US 380, which is currently experiencing increased travel times and congestion and is located five miles south of the proposed project. It is estimated that the US 380 corridor will have severe congestion in 2045 under Mobility 2045's No-Build scenario.

The proposed project connects to potential five major facilities as shown in Table 2.4.

Table 2.4. System Linkages

Roadway	Existing Facility	Future 2045 Facility	Major Direction
Dallas Parkway/ Dallas North Tollway	2-lane rural	6-lane tolled with 6-lane frontage road	North-South
Collin County Outer Loop (DNT to US 75)	Nothing (under engineering design)	6-lane freeway with 6-lane frontage road	East-West
US 377	2-lane rural roadway	6-lane roadway	North-South
IH 35	4-lane freeway with 4-lane frontage road	6-lane freeway with 4/6-lane frontage road	North-South
Loop 288	4-lane arterial	4-lane arterial	East-West

The Denton Greenbelt Corridor would provide a crucial east-west facility to connect these major facilities.

2.2 INTENT OF DENTON GREENBELT CORRIDOR

Mobility 2045 included the Denton Greenbelt Corridor as part of a long-term multimodal vision for the region to serve east-west automobile and truck traffic in northern Denton County to accommodate future growth. The Denton Greenbelt Corridor was envisioned as a potential series phased construction, adding additional lanes as traffic warranted. The intent of the Denton Greenbelt Corridor is to:

- Improve capacity, mobility, and accessibility for outlying communities and developing areas in northern Denton County by providing direct links to existing major radial highways.
- Serve northern Denton County that currently lacks major east-west facilities for inter-suburban travel
- Help manage long-term regional congestion from rapid population and employment growth and development.
- Provide the basic transportation infrastructure necessary to allow for expansion that accommodates varied travel demands or modes as warranted.
- Provide a system that integrates with current and proposed land use and promotes development outlined by the cities and Denton County.

3.0 AFFECTED ENVIRONMENT

This chapter illustrates the current social, economic, and natural environmental resources available within the study area for the Denton Greenbelt Corridor. It discusses the methodology/research used, existing conditions, and when available, future projections and plans. Local resources presented include land use, farmland, demographics, community resources, cultural resources, parklands and recreational areas, visual quality, utilities, employment, development, air quality, geology, soils, water resources, biological resources, and regulated/hazardous materials. Where applicable, the current state and federal regulations are also cited to help provide context to the section.

During the explanations, the term alignment area is used. The alignment areas include a buffer area that is 1,000 feet from the center line of the alignment, as shown in Figure A-1 in Appendix A. Each alignment is expanded by 1,000 feet from the center line to capture potential impacts in the immediate surrounding area of the proposed corridor.

3.1 GENERAL DATA SOURCES

The information used in this study comes from a variety of sources. A complete inventory of the datasets used is contained in Appendix B. Each of the topics discussed in this chapter will specify the most current data used in the analysis. The North Central Texas Council of Governments (NCTCOG) creates and maintains a number of datasets in its roles as the Council of Governments and as a data clearinghouse for municipalities and counties within the 16-county NCTCOG region. This includes a complete inventory of area roadways and other transportation facilities; current and forecast demographic data; historic, current, and future land use inventories; political boundaries from the local to national level; and locations of parklands, lakes, and streams.

In addition, data were acquired from both federal and state resources for use in this study. Among the data collected from federal agencies are Census data from the United States Census Bureau, soil data from the US Department of Agriculture, a list of threatened and endangered species from the US Fish and Wildlife Service, and floodplain maps from the Federal Emergency Management Administration. Texas state agencies provided locations of historic sites and districts from the Texas Historical Commission; locations of environmentally impaired lakes and streams from the Texas Commission on Environmental Quality; and information regarding vegetation types, natural diversity, and threatened and endangered species from the Texas Parks and Wildlife Department.

3.2 SOCIAL CONDITIONS

This section discusses land use, farmland, demographics, community resources, cultural resources, parkland and recreational areas, visual quality and aesthetics, and utilities within the study area.

3.2.1 Land Use

This section describes the current land uses, and local government plans in the study area.

3.2.1.1 Legal and Regulatory Context

Chapter 211 of the Local Government Code establishes the framework under which municipal governments in Texas control land use. The purpose of this code is to promote public health, safety, morals, or general welfare and to protect and preserve places and areas of historical, cultural, or architectural importance and significance. This code allows municipal governments (local municipalities) to have direct control to establish rules for the use of structures and land.

Section 211.004 of the Local Government Code requires that zoning regulations adopted must conform to a comprehensive plan. Each municipality has the ability to set regulations for land use and zoning within its boundaries. In addition, counties can regulate land use in non-incorporated areas in their county. Section 232 of the Local Government Code gives the counties the right to review and regulate the subdivision of land. With this power, counties can require additional changes or requirements for approval when land is submitted for subdivision such as water supply, drainage, transportation infrastructure, and environmental controls. Each county and municipality in the study area has various land use and zoning regulations implemented for control of growth.

3.2.1.2 Methodology/Research

Land use in the study area was identified using Geographic Information System (GIS) 2015 land use data obtained from NCTCOG. The data from the study area was compared to land use data for each block group in the study area. The comprehensive plans of several municipalities, as well as Denton County and Collin County, were reviewed to determine potential future land use projections.

3.2.1.3 Existing Conditions and Future Projections/Plans

NCTCOG GIS files for 2015 land use data were used. The land use data is divided into nine categories: residential, government/educational, commercial, industrial, infrastructure, airports, dedicated, water, and undeveloped. Table 3.1 shows the 2015 configuration of land use types within the alignment areas. Figure A-2 in Appendix A graphically illustrates the land use in the study area.

Table 3.1. 2015 Land Use

Land Use Type	Alignment			
	1		2	
	Acres	Percent	Acres	Percent
Commercial	70.6	1.2%	21.7	0.4%
Dedicated	32.0	0.6%	34.3	0.6%
Industrial	0	0.0%	4.4	0.1%
Infrastructure	8.2	0.1%	6.7	0.1%
Institutional	177.3	3.1%	18.7	0.3%
Residential	396.9	6.9%	425.7	7.7%
Farmland/ Ranchland	2971.1	51.9%	3608.3	65.6%
Acreage (Improved/ Residential)	1240.4	21.7%	1029.7	18.7%
Timberland	252.9	4.4%	89.7	1.6%
Vacant	129.4	2.3%	49.9	0.9%
Water	66.6	1.2%	34.4	0.6%
Total	**5724.9**	**100.0%**	**5503.4**	**100.0%**

Source: NCTCOG, 2015
Notes: 1. Percentage totals may not equal 100 percent because of rounding
2. Dedicated land includes parks, recreation land, landfills, and flood control

As shown in Table 3.1, the land uses in the alignment areas reflect the rural location of the corridor. The majority land use for both of the alignment areas is farm or ranch land, accounting for 52 percent of Alignment 1 and 66 percent of Alignment 2. Improved acreage, a majority of which is residential, had the next largest percentage of land use, with 22 percent in Alignment 1

and 19 percent in Alignment 2. Developed land includes residential, commercial, and industrial and infrastructure; this land use accounts for less than 12 percent of the land in Alignment 1 and 9 percent of Alignment 2.

The Regional Outer Loop, of which the Denton Greenbelt Corridor is a part, is included as a Planned Transportation Improvement in the Denton County Thoroughfare Plan (Denton County, 2017). The corridor is also included in the Collin County Thoroughfare Plan as a part of the Collin County Outer Loop project (Collin County, 2016, 2018).

The Denton Greenbelt Corridor, which includes some area in Collin County, was included in several municipal plans. It was included in the city of Aubrey's land use and thoroughfare plans, as well as in the city of Celina's comprehensive and thoroughfare plans. The city of Denton did not include the Greenbelt Corridor in their 2015 Mobility Plan or their comprehensive plan, Denton Plan 2030, the city's long-range comprehensive plan. However, the comprehensive plan did recognize the value of the Greenbelt recreation area to the city and the need to maintain its conservation and access by citizens.

Table 3.2 describes comprehensive plans, land use, and zoning plans that include the Denton Greenbelt Corridor.

Table 3.2. Inclusion in Municipal Plans

Municipality	Date of Latest Plan	Inclusion in Comprehensive Plan, Land Use, and Zoning Plans
Aubrey	2015	Yes
Celina	2018	Yes
Denton	2016	No

Source: City of Aubrey, 2015, City of Celina 2015, 2018, and City of Denton, 2015, 2016.

NCTCOG used the Federal Highway Administration's INVEST (Infrastructure Voluntary Evaluation Sustainability Tool) to identify sustainability-related content to include in corridor-scale studies. NCTCOG-developed INVEST criteria CS-01.1 identifies how transportation need can meet economic development and land use planning, while CS-01.3 addresses how alignments would overlay with land uses. These criteria are represented by the results discussed in 1.2.1.

3.2.2 Farmland

3.2.2.1 Legal and Regulatory Context

The Farmland Protection Policy Act provides protection to prime and unique farmlands, as well as farmlands of statewide or local importance. The US Department of Agriculture defines prime and unique farmlands as lands best suited to producing food, feed, forage, and oilseed crops. These soils have properties which are favorable for the production of sustained high yields. The Farmland Protection Policy Act ensures that federal programs are administered in a manner that is compatible with state, unit of local government, and private programs to protect farmland to the maximum extent practicable.

3.2.2.2 Methodology/Research

According to federal regulations (7 Code of Federal Regulations Chapter VI Part 658, Section 658.2, "Definitions), farmland does not include land already in or committed to urban

development. Prime and unique farmland was determined based on the 2018 Natural Resources Conservation Service soil database.

3.2.2.3 Existing Conditions and Future Projections

Within the Greenbelt corridor, 47 percent of the area within Alignment 1 is prime farmland, compared with 49 percent for Alignment 2. This information is shown in Table 3.3 and in Figure A-3 in Appendix A. The number of farms and acreage of farmland increased in Collin and Denton counties from 2007 to 2012. However, the average farm size has decreased in Denton County (Table 3.4).

Table 3.3. Prime Farmland

Alignment	Prime Farmland (acres)		Not Prime Farmland	
	Acres	Percent of Alignment	Acres	Percent of Alignment
1	2679.0	46.8%	3046.0	53.2%
2	2705.7	49.2%	2797.7	50.8%

Source: Natural Resources Conservation Service Web Soil Survey 2018

Table 3.4. Changes in Farmland from 2007 to 2012

County	Number of Farms			Land in Farms (acres)			Average Farm Size (acres)		
	2007	2012	Percent Change	2007	2012	Percent Change	2007	2012	Percent Change
Collin	2,235	2264	1	290,831	312806	8	130	138	6
Denton	2,575	3202	24	350,274	383533	9	136	120	-12
Total	25,940	29308	12.98	3,595,153	3983486	10.8	138	135.5	-1.84

Source: US Department of Agriculture: National Agriculture Statistics Service 2007, 2012

3.2.3 Demographics

This section presents information related to population, race, ethnicity, income, and language.

3.2.3.1 Legal and Regulatory Context

Presidential Executive Order 12898 entitled Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations mandates that each federal agency "shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations…" The three fundamental principles of environmental justice are as follows:

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

Federal Highway Administration (FHWA) Order 6640.23 provides guidance on determining when a disproportionately high and adverse effect is likely and how to respond if such a finding is made. In accordance with Title VI of the Civil Rights Act of 1964 (Title VI), Executive Order 12898, and FHWA Order 6640.23, data on the presence of minority and low-income populations were evaluated at the alignment area level to identify potential areas of these populations to

help avoid and/or minimize "disproportionately high and adverse effects." FHWA Order 6640.23 states that "disproportionately high and adverse effect on minority and low-income populations means an adverse effect that will be suffered by the minority population and/or low-income populations and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the nonminority population and/or non low-income populations."

The objective of US Department of Transportation Order 5610.2 was to develop a process that "integrates the existing statutory and regulatory requirements in a manner that helps ensure that the interests and well-being of minority populations and low-income populations are considered and addressed during transportation decision making." The policy states, "this will be done by fully considering environmental justice principles throughout planning and decision-making processes in the development of programs, policies, and activities, using the principles of the National Environmental Policy Act of 1969…"

The federal Council on Environmental Quality guidance document *Environmental Justice: Guidance Under the National Environmental Policy Act*, states that minority populations should be identified as either: the minority population of the affected area exceeds 50 percent or the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. The guidance document states low-income populations should be identified using the annual statistical poverty thresholds from the Census Bureau's Current Population Reports, Series P-60 on Income and Poverty.

Executive Order 13166, "Improving Access to Service for Persons with Limited English Proficiency," requires federal agencies to examine the services they provide and identify any need for services to those with limited English proficiency (LEP). The Executive Order requires federal agencies to ensure that recipients of federal financial assistance provide meaningful access to their LEP applicants and beneficiaries. Failure to ensure that LEP persons can effectively participate in or benefit from federally assisted programs and activities may violate the prohibitions under Title VI of the Civil Rights Restoration Act of 1987 and 42 US Code (USC) 2000d against national origin discrimination.

3.2.3.2 Methodology/Research

Population, income, and LEP data were obtained for this section from the US Census Bureau utilizing GIS. The 2015 American Community Survey (ACS) five-year estimates (2011-2015) were used for race or ethnicity, income, and LEP. LEP populations included individuals five years old and older who speak English less than "very well." Data was analyzed for block groups with all or only part of their area within the alignment areas. Population forecasting data in this section was provided by the Texas Water Development Board.

3.2.3.3 Existing Conditions and Future Projections

Populations for the counties in the study area are projected to increase by 2050, at rates from 110 percent in Collin County to 137 percent in Denton County. The overall population for the two counties in 2010 was 1,444,955; this is expected to increase by 123 percent by 2050 to 3,323,087. Table 3.5 illustrates the population forecast for the counties and municipalities in the study area. Populations for the municipalities in the study area are projected to increase by 2050, at rates from 201 percent in the city of Denton to 2,388 percent in the city of Celina. The overall population for the three municipalities in the alignment areas is expected to increase by 310 percent by 2050.

Table 3.5. Population Forecast

Location	Population		Change from 2010 to 2050	Percent Change
	2010[1]	2050[2]		
Collin County	782,341	1,646,663	864,322	110.5%
Denton County	662,614	1,576,424	913,810	137.9%
County Total	**1,444,955**	**3,223,087**	**1,778,132**	**123%**
City of Aubrey	2,595	8,713	6,118	235.8%
City of Celina	6,028	150,000	143,972	2388.4%
City of Denton	113,383	341,471	228,088	201.2%
Municipality Total	**278,172**	**885,945**	**607,773**	**310.0%**

Source: [1] 2010 US Census, [2] Texas Water Development Board, 2015

Minority racial and ethnic composition for the ACS data utilized is defined as:

- American Indian or Alaska Native (having origins in any of the original peoples of North and South America (including Central America) and who maintain tribal affiliation or community attachment).
- Asian (having origins from any of the original peoples of the Far East, Southeast Asia, or the Indian Subcontinent).
- Black or African American (having origins from any black racial groups of Africa).
- Hispanic or Latino (identifying as belonging to one or more of the following specific categories, regardless of race: Mexican; Puerto Rican; Cuban; Dominican; Salvadoran; Guatemalan; Argentinean; Colombian; Spaniard; or other Hispanic, Latino, or Spanish cultures or origins).
- Native Hawaiian or Other Pacific Islander (having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands).
- Two or More Races (identifying as belonging to a race other than “White,” “Black or African American,” “American Indian or Alaska Native,” “Asian,” or “Native Hawaiian or Other Pacific Islander”).

Table 3.6 provides 2011-2015 ACS data on minority, racial, and ethnic composition at the block group level. Figure A-4 in Appendix A illustrates the percent minority populations of the block groups in the alignment areas. Most block groups within the alignment areas are predominately non-minority. The block groups which encompass the city of Denton and the city of Aubrey have the highest minority populations within the alignment areas. Hispanic or Latino populations are the largest minority group in the alignments, with approximately 17 to 19 percent.

Table 3.6. Race and Ethnic Composition of the Alignments

Alignment	Total Population	Percent Black or African American	Percent American Indian or Alaska Native	Percent Asian	Percent Native Hawaiian or Other Pacific Islander	Percent Two or More Races	Percent Hispanic or Latino
1	40,658	3.4%	0.6%	1.3%	0.1%	2.9%	17.0%
2	31,122	2.9%	0.6%	1.4%	0%	2.7%	18.7%

Source: 2011-2015 ACS 5-year estimates

Note: Block groups with all or only part of their area within the alignments were used to represent the population potentially affected by the proposed project. This means that the true population within the alignments may be slightly lower than reported.

Low-income population is defined as any readily identifiable group of low-income persons who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who would be similarly affected by a proposed FHWA program, policy, or activity. The Council on Environmental Quality has guidance stating low-income populations should be identified using poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty (Council on Environmental Quality, 1997). ACS data on populations below poverty uses this same definition and is used in the following analysis.

Low-income populations were examined at the block group level. Figure A-5 in Appendix A illustrates that all block groups in the alignment areas are above the poverty threshold. Table 3.7 shows block groups partially or wholly within the alignment areas. Approximately 9 to 10 percent of the population is under the poverty level; in 2017, the weighted average poverty threshold was $25,094 for a family of four and $12,488 for an individual. Of the 18 block groups analyzed, 6 had over 15 percent of the population under poverty level in the previous 12 months and 12 had a range between 0 percent and 10 percent.

Table 3.7. 2011-2015 ACS Income

Alignment	Median Income in 2015 Dollars		Total Per Capita Income in 2015 Dollars	Population Below Poverty	Percent Below Poverty
	Households	Families			
1	101,178	92,431	39,848	3,489	8.6%
2	112,314	99,067	40,253	3,044	9.8%

Source: 2011-2015 ACS 5-year data
Note: Block groups partially or wholly within the alignments were used to represent the population potentially affected by the proposed project. This means that the true population within the alignments may be slightly lower than reported.

Table 3.8 provides a summary of the LEP data for the alignment areas. Figure A-6 in Appendix A provides total LEP data by block group within the alignment areas. LEP populations within the alignment area block groups ranged from 0 percent to 7 percent, averaging 1.7 percent. Based on this information, there is a very small LEP population within the alignment areas. Six to 7 percent of the alignment areas' populations spoke Spanish but spoke English less than "very well," 0.2 percent spoke Indo-European languages, 0.3 percent spoke Asian/Pacific Island languages, and none spoke other languages.

Table 3.8. LEP Population within the Alignment Areas

Alignment	Aged Five Years or Older		Total LEP	
	Population	Percent	Population	Percent
1	38,063	93.6%	2,574	6.3%
2	29,007	93.2%	2,261	7.3%

Source: 2011-2015 ACS 5-year estimates
Notes: Block groups partially or wholly within the alignments were used to represent the population potentially affected by the proposed project. This means that the true population within the alignments may be slightly lower than reported.

Total LEP is defined by those individuals aged five years or older and who speak English less than "very well."

The information in this section identifies the potentially affected environmental justice, Title VI, and transportation disadvantaged groups whose inclusion and engagement are addressed in

INVEST criteria CS-06.3**.** The alignments are shaded in blue in Figure A-7 in Appendix A. The eastern half of the northern and southern alignments overlaid Census block groups below the region's percentage for low-income populations and for minority populations based on NCTCOG's Environmental Justice Index as seen in Figure A-7. Portions of the western half of both alignments (shaded in blue) overlaid block groups above the region's percentage for low-income populations (shaded in yellow – darker shades indicate higher population density) and for block groups above the region's percentage for both low-income and minority populations (shaded in green). A review of aerial imagery identified few properties in the northern alignment as it traveled through these block groups. Several of the properties had swimming pools, making it unlikely these were low-income households. The western portion of the southern alignment travels along the existing Loop 288. While the stakeholder engagement efforts were not formal public involvement, techniques such as visualizations (presentations and large map displays) were employed and meetings were held within the corridor. NCTCOG sought to reach a broader range of stakeholders by attending the Aubrey Peanut Festival. Information about the INVEST project was posted on NCTCOG's website.

INVEST criteria CS-08.1 calls for the study to analyze the equity of physical access for the corridors. The alignments will include frontage roads except where the corridor travels through the Denton Greenbelt. The frontage roads provide equitable physical access to all users of the roadway.

3.2.4 Community Resources

This section will discuss the community facilities and services within the study area.

3.2.4.1 Legal and Regulatory Context

There are no specific legal or regulatory contexts for analyzing community resources.

3.2.4.2 Methodology/Research

An analysis was performed to inventory community facilities and services. Using NCTCOG GIS and Texas Education Agency data, the existing alignment areas were examined.

3.2.4.3 Existing Conditions

The Denton Greenbelt Corridor area includes portions of two counties and 18 block groups. Communities within the alignment areas are characterized by varying degrees of cohesion. Strong community cohesion is characterized by extensive interaction among neighbors and friends, participation in community activities and organizations, and involvement in local government and politics. Typically, cohesive communities have several generations of families, extended families, and strong informal (non-governmental) social support networks, which can provide for child care, emergency assistance, and spiritual guidance, among other possibilities. Given the farming and ranching history in the rural areas, it is anticipated that community cohesion may be evidenced by generational farm/ranch ownership, shared ranching/farming community events, as well as outdoor recreational activities related to camping, fishing, and hiking. Transportation and land use changes can have effects on community cohesion.

There are 12 public facilities/services in nine categories within the alignment areas of the Denton Greenbelt Corridor. Table 3.9 provides a summary listing of those categories. Figure A-8 in Appendix A shows these facilities. More information about the parklands and recreational areas can be found in Section 3.2.6.

Table 3.9. Community Facilities

Public Facility	Count of Facilities for each Alignment	
	1	2
Apartment	1	
Arena/Stadium	1	
Cemetery		1
Education	2	
General Aviation	1	3
Strip Center	1	
Worship	1	1
Total	**7**	**6**

Source: 2017 NCTCOG Features

Public schools are administered by five independent school districts within the alignment areas. These independent school districts are summarized in Table 3-10.

Table 3.10. ISDs within the Alignment Areas

ISD
Aubrey, Celina, Denton, Pilot Point, Sanger

Source: 2018 School data from the Texas Education Agency

The Dallas-Fort Worth Regional Travel Model for the Extended Area includes major activity centers known as special generators. These non-work based sites tend to attract more trips to the area. The travel demand model includes three types of special generators – regional shopping malls with over 500,000 square feet; universities and colleges with over 1,500 enrolled students; and hospitals with over 300 service employees. Larger airports are also considered special generators. The alignment areas include no major activity centers, known as special generators, as identified by the Dallas-Fort Worth Regional Travel Model for the Extended Area.

3.2.5 Cultural Resources

3.2.5.1 Legal/Regulatory Context

The National Historic Preservation Act of 1966, as amended (16 USC 470 et seq.), Executive Order 11593, and the Antiquities Code of Texas are the legal statutes that help protect and preserve cultural resources.

Section 106 of the National Historic Preservation Act (NHPA) – Federal guidelines established under Section 106 of NHPA, as amended, require that the severity of impacts be considered by federal agencies before selection and construction of a project. According to Secretary of the Interior Guidelines (36 CFR 800), adverse effects may occur, either directly or indirectly, when a project alters or destroys the physical, associative, or informational qualities that contribute to a resource's historical, archeological, or cultural significance. Archeological resources are usually considered in terms of buried cultural deposits.

Under Section 106 of the NHPA, as amended, the term "historic" means that a resource meets several criteria for eligibility to the National Register of Historic Places (NRHP). Generally, a resource must be 50 or more years old to be further considered for NRHP eligibility. In addition

to the 50-year age criterion, NRHP eligibility requires a resource to meet at least one of four primary criteria for historical significance, as well as several forms of physical integrity (36 CFR 800). The four primary criteria for historic significance include association with events that have made a significant contribution to patterns of our history, association with significant persons, distinctive architectural design or representation of the work of a master, or have yielded or may yield important information in history or prehistory. Seven physical factors also considered in evaluating NRHP eligibility include integrity of location, design, materials, workmanship, feeling, setting, and association.

Antiquities Code of Texas (ACT) – The ACT was established by Senate Bill No. 58, Chapter 442, Government Code of Texas, and was redefined as the Texas Natural Code of 1977, a formal revision of the statutes to the public domain. Title 9, Chapter 191 pertains to the ACT (amended September 1997). The code states that it is public policy and in the public interest to locate, protect, and preserve all sites, objects, buildings, pre-20th century shipwrecks, and locations of historical, archeological, educational, or scientific interest. These include, but are not limited to, prehistoric and historical American Indian or aboriginal campsites, dwellings, and habitation sites; archeological sites of every character; treasure imbedded in the earth; sunken or abandoned ships and wrecks of the sea or any part of their contents, maps, records, documents, books, and artifacts; and implements of culture in any way related to the inhabitants, prehistory, history, natural history, government, or culture in, on, or under any of the land in the state of Texas, including the tidelands, submerged land, and the bed of the sea within the jurisdiction of the state of Texas.

In 1995, the Texas Historical Commission (THC) was made the legal custodian of the ACT and therefore of all cultural resources, historic and prehistoric, within the public domain of the state of Texas. Such diverse resources may be designated as State Archeological Landmarks by the THC.

Executive Order 11593 – Executive Order 11593 requires federal agencies to administer cultural properties under their control and direct their policies, plans, and programs in such a way that federally owned sites, structures, and objects of historical, architectural, or archeological significance are preserved, restored, and maintained. To achieve this goal, federal agencies are required to locate, inventory, and nominate to the NRHP all properties under their jurisdiction or control that appear to qualify for listing in the National Register. Executive Order 11593 obligates agencies to conduct adequate surveys to locate "any" and "all" sites of historic value, although this requirement applies only to federally owned or federally controlled properties. It also directs agencies to reconsider any plans to transfer, sell, demolish, or substantially alter any property determined to be eligible for the National Register and to afford the Advisory Council on Historic Preservation an opportunity to comment on any such proposal for properties within federal control or ownership. The Executive Order required agencies to record any listed property that may be substantially altered or demolished as a result of federal action or assistance and to take necessary measures to provide for maintenance of and future planning for historic properties.

Section 4(f) of the US Department of Transportation Act of 1966 – Projects using US Department of Transportation funds or requiring a license from its agencies must meet the requirements of Section 4(f) of the US Department of Transportation Act of 1966 (49 USC 303). Section 4(f) declares it a national policy to make a special effort to preserve the natural beauty of the countryside, including parks and recreational land, wildlife and waterfowl refuges, and historic sites. Section 4(f) prohibits the Secretary of Transportation from approving projects that require the use of significant publicly owned parks, recreation areas, or wildlife and waterfowl

refuges, or any significant historic (NRHP-eligible or listed) sites unless a determination is made that there is no feasible and prudent alternative to such use and the project includes all possible planning to minimize harm to the property resulting from such use. When such resources are affected, the documentation of no feasible or prudent alternative and planning to minimize harm is included in environmental analysis.

3.2.5.2 Methodology/Research

The THC Texas Historic Sites Atlas was utilized to review the Official State Historical Markers and the NRHP properties in Texas. Potential Archeological Liability Maps from the Texas Department of Transportation were also used to review potential areas of archeological concern in the alignments. With a projected constructed date of 2037, 1987 was established as the cutoff date for evaluating non-archeological resources that meet the 50-year age guideline for NRHP eligibility. This date was established to help assess if a structure could be of historic age, and not establish NRHP eligibility. GIS parcel data were used in the study area to find the year any buildings on the parcel were built. All of these features were investigated using GIS data to identify potential historical resources and locations in the study area.

Several INVEST criteria related to historical, archaeological, and cultural preservation criteria are addressed in this section. CS-04.1 addresses identifying whether the alignments overlay with historic cemeteries, National Register Districts, National Register Properties, archeological sites, and parcels with older buildings. Criteria CS-04.1 results would duplicate the results of the historic cemeteries, National Register Districts and National Register Properties, and parcels with older buildings data already found in this section of the study. Archeological data, which is not already covered in this study and is a component of criteria CS-04.1, will also be included in this section.

3.2.5.3 Existing Conditions and Future Projections

Using 2017 THC data, an analysis found no nationally registered district or properties exist within the alignment areas.

The THC Local History Programs Division maintains a database, updated biannually, of more than 500 museums throughout the state. The types of museums compiled are general, art, historic, science, aviation, military, and children's museums, as well as special interest museums catering to interests as diverse as agriculture and firefighting or chronicling personalities from Texas. Based on this database, there is one museum within the alignment areas. The museum, the Denton County Historical Museum/Texas Heritage Center, is located in the city of Denton. This museum and location can be found on Figure A-9 in Appendix A.

THC also maintains a database of Historical Markers, which can be a person, place, and/or event. A Recorded Texas Historic Landmark is a type of historical marker. The landmarks, protected by state law, are properties that must be at least 50 years in age and be judged as historically or architecturally significant. Within the alignment areas, there is one Recorded Texas Historic Landmark, the Elm Fork Bridge, which is located in the Greenbelt recreation area. The historic bridge is a part of the trail system and provides sole access at its specific location for visitors to cross the river. The historic iron/steel bridge is one of only two bridges that remains at its original location in Denton County. Figure A-9 in Appendix A shows the location of the bridge.

The THC lists one cemetery in the alignment area. The cemetery is called the Green Valley Cemetery and is located within the area of Alignment 2. Figure A-10 in Appendix A shows the location of the cemetery in the alignment areas.

Potential Archeological Liability Maps data from the Texas Department of Transportation Dallas District was used to determine the likelihood of prehistoric archeological sites to be preserved in the alignment areas. The data for low, moderate, and high potential is given at two depths: shallow, or less that one meter below surface; and deep, or greater than one meter below surface. Table 3.11 lists the potential for archeological sites in the alignment areas. Figures A-11 and A-12 in Appendix A show the locations of these sites in the alignment areas.

Table 3.11. Potential Archeological Liability Maps

Alignment	Potential	Shallow (Acres)	Deep (Acres)
1	Low	3174.9	3944.1
	Moderate	1563.2	960.2
	High	932.5	766.3
2	Low	2676.8	3543.3
	Moderate	1808.4	1124.3
	High	976.89	794.5

Source: Texas Department of Transportation, n.d.

To identify potential historic-aged resources and locations in the study area, available parcel data in Denton County and Collin County that contained records of the year a structure was built was evaluated. As mentioned in Section 3.2.5.2, 1987 was established as the cutoff date for evaluating non-archeological resources that meet the 50-year age guideline for NRHP eligibility. There are 274 parcels that have a structure that was built in or prior to 1987 in the Alignment 1 area and 83 in the Alignment 2 area. Age alone does not establish NRHP eligibility. Section 3.2.5.1 discusses the eligibility criteria for listing on the NRHP. Table 3.12 shows the number of structures built from 1900 to 1987 grouped by decade constructed. The range begins at 1900 as no structure in the alignment areas was built before then. Figure A-9 in Appendix A shows the locations of these structures

Table 3.17. Number of Potentially Historic Structures According to 2017 Parcel Data

Years	Number of Structures by Alignment	
	1	2
1900 to 1910	0	1
1911 to 1920	0	1
1921 to 1930	0	1
1931 to 1940	0	1
1941 to 1950	7	3
1951 to 1960	7	10
1961 to 1970	159	14
1971 to 1980	43	22
1981 to 1987	58	30

Source: 2017 parcel data for Denton County and Collin County

There is potential for future development within the alignment areas that could remove currently listed historic-aged structures. Some of the historic-aged structures that may be affected by potential development may fall under federal or state regulatory resource protection review and could be protected, preserved, or mitigated. However, residential and commercial development

would not fall under the regulatory review process; therefore, historic resources in these developments would have no protection under federal or state laws.

3.2.5.4 Scenic Trails

INVEST criteria CS-04.2 addresses whether alignments overlay a State Scenic Trail or route officially designated as significantly historical, cultural, or archeological.

FHWA identifies 150 byways in the United States that have been designated by the US Secretary of Transportation as having archeological, historical, cultural, natural, or recreational qualities in its National Scenic Byways Program. There have been no byways designated in Texas.

As a part of an effort to create a statewide heritage tourism program, the THC created a Texas Heritage Trails Program, which identifies 10 scenic driving trails in the state. The Texas Heritage Trails Program is an economic initiative encouraging the promotion of Texas' historical and cultural resources with the goal of local preservation, increasing local tourism, and ultimately bringing more money into Texas communities. One of these trails, the Texas Lakes Trail, directly overlays with parts of both proposed alignments for the Denton Greenbelt Corridor.

3.2.6 Parklands and Recreational Areas

3.2.6.1 Legal/Regulatory Context

Section 4(f) of the USDOT Act of 1966 [Title 49 USC, Section 1653 (f) as amended and codified in 49 USC, Section 303 in 1983], states the Secretary of Transportation may approve a transportation program or project requiring use of publicly owned land of a public park, recreation area, wildlife/waterfowl refuge, or land of a historic site of national, state, or local significance (as determined by the officials having jurisdiction over the park, recreation area, refuge, or site) only if there is no prudent and feasible alternative to such use and the project includes all planning to minimize harm.

The Texas Parks & Wildlife Department (TPWD) Code, Title 3, Chapter 26 contains similar language concerning the taking of park and recreational lands. TPWD restricts the use or taking of any public land designated and used as a park (recreation area, scientific area, wildlife refuge, or historic site) unless the department, agency, political subdivision, county, or municipality determines there is no feasible and prudent alternative and that the project/program includes all reasonable planning to minimize harm to the land.

Section 6(f) of the Land and Water Conservation Fund Act requires that any outdoor recreational facilities acquired with Department of Interior financial assistance under the Land and Water Conservation Fund Act, as allocated by TPWD, may not be converted to non-recreational use unless approval is granted by the director of the National Park Service.

3.2.6.2 Methodology/Research

Existing park and recreation areas were identified based on project mapping. The locations of parks and recreational areas were mapped in three data sources: the NCTCOG land use dataset, the NCTCOG features dataset, and the US Geological Survey Protected Lands database. The National Conservation Easement database was also used to determine if there were any conservation easements in the proposed alignment areas.

INVEST criteria CS-03.1 addresses whether alignments overlay scenic, natural, or recreational qualities. The recreational component of this criteria will be addressed in this section.

3.2.6.3 Existing Conditions and Future Projections

There are three existing or proposed parks and recreational facilities within the study area. See Table 3.13 for a breakdown of the recreational facilities by location and type of facility. Most of the identified facilities are neighborhood or community parks located within the municipal limits of communities within the study area. Using the National Conservation Easement Database, no conservation easements were identified in the study area. However, through stakeholder engagement, NCTCOG learned of US Army Corps of Engineers conservation easements on either side of the Texas Department of Transportation right-of-way, where both alignment areas cross the state park. Figure A-13 in Appendix A shows the locations of specific parklands and recreation areas and Table 3.13 lists the identified facilities. Spatial data of the US Army Corps of Engineers conservation easements were unavailable and therefore are estimated in the figures.

Table 3.13. Parklands and Recreation Area by Alignment

Type	Count of Recreation of Parkland	
	Alignment 1	Alignment 2
State Park	1	1
Amusement Park	1	0
Stadium/Arena	1	0
Conservation Easement	1	1

Source: NCTCOG 2015, NCTCOG 2017, US Geological Survey 2016

3.2.7 Visual Quality and Aesthetics

3.2.7.1 Legal/Regulatory Context

Federal and state regulations require that visual impacts be addressed as part of the Section 106 and Section 4(f) processes. Guidelines have been released by several federal agencies as a result of the National Environmental Policy Act's requirement to "assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings. FHWA guidelines include the consideration of residential properties in a visual assessment. However, there are no specific federal or state visual regulatory requirements that apply to properties that are not designated historic, eligible for listing in the NRHP, or parkland.

3.2.7.2 Methodology/Research

Potential visual sensitive receptors are historical resources, parklands, recreational areas, and residential areas. Within the Denton Greenbelt Corridor alignment areas, these potential visual sensitive receptors were identified using GIS from the Texas Historical Atlas, which is maintained by the THC, and GIS from NCTCOG for parklands and recreational areas. In additional, residential areas were located using 2015 NCTCOG land use GIS data.

INVEST criteria CS-05.1 addresses areas that may be negatively impacted by light pollution, including uplighting, backlighting, and glare. This criteria will be addressed in this section.

3.2.7.3 Existing Conditions and Future Projections

Using GIS, potential sensitive visual receptors were located in the Denton Greenbelt Corridor alignment areas. The results are shown in Table 3.14. They are also shown in Appendix A,

Figure A-2 for residential land use, Figures A-9 and A-10 for historical resources, and Figure A-13 for parks and recreational areas.

Table 3.14. Visual Sensitive Receptors in the Alignment Areas

Alignment	Parks and Recreational Areas		Historical Resources	Residential Land Use (acres)
	Count	Acres		
1	3	66.4	1	396.9
2	1	67.0	2	425.7

Source: NCTCOG GIS Land Use, 2015; NCTCOG GIS Features, 2017; Texas Historical Atlas GIS National Register Properties, National Register Districts, State Historic Sites, and Cemeteries, 2018

Natural areas are particularity sensitive to light pollution that may result from the proposed corridor. The Ray Roberts State Park is a natural area that may be impacted by increased and changing light pollution and is located in both proposed alignments.

As stated in previous sections, the urbanization of the Dallas-Fort Worth area continues to push farther out from the central areas. As this occurs, natural open areas decline and loss of parks, recreational areas, and historical resources could occur. Although these visual sensitive receptors could decline, residential visual sensitive receptors could increase as growth continues in the rural areas. Additionally, this urbanization would spur infrastructure improvements to support the population and commercial growth. These infrastructure improvements would include local streets, power lines, pipelines, multi-story buildings, channelization of streams, rural roadways, and higher speed highways. The increases in infrastructure around sensitive receptors could diminish the potential value of the visual and aesthetic resources and reduce the number of sensitive receptors.

3.2.8 Utilities

3.2.8.1 Legal/Regulatory Context

Because utilities are private companies, no specific legal or regulatory laws protect them. Any impacts such as right-of-way purchasing would follow the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 USC 4601). The relocation of existing utilities is conducted through agreements with the implementing agency (e.g., local governments, state agencies) and the specific utility company.

3.2.8.2 Methodology/Research

The location of pipelines and wells was obtained through the Railroad Commission of Texas through GIS. Power plant locations were obtained through NCTCOG GIS databases. Utilities that occurred within the alignment areas were determined. Future projections of utilities were researched based off the future growth discussed in previous sections and through the Railroad Commission of Texas.

3.2.8.3 Existing Conditions and Future Projections

Well and pipeline data were obtained through the Railroad Commission of Texas to determine the location of these resources in the alignment areas. Table 3.15 tabulates the number of wells and length of pipelines in the alignment areas. These are also shown on Figure A-14 in Appendix A.

Table 3.20. Wells and Pipelines

Alignment	Wells (number)	Pipelines (Length in miles)
1	0	6.5
2	0	10.7

Source: Railroad Commission of Texas GIS – Pipelines and Wells, 2008

There were no wells in either alignment area. Alignment 2 had more length of pipeline than Alignment 1. The pipelines identified in the alignment areas carry natural gas liquids, gasoline, and natural gas. The majority of the product through the pipelines in the alignment areas is natural gas, which totaled 79.5 percent in Alignment 1 and 73.0 percent in Alignment 2. Natural gas liquids accounted for 6.7 percent and 23.1 percent, respectively, in Alignment 1 and 2. Gasoline accounted for 13.8 percent and 3.8 percent, respectively, in Alignment 1 and 2. Using GIS data provided by NCTCOG, utilities were located in the alignment areas. The results of the research found two utilities, both in Alignment 1. These are shown on Figure A-15 in Appendix A.

INVEST criteria CS-14.4 addresses electric vehicle technology. The Denton Greenbelt Corridor connects to IH 35, an Energy Corridor. Because the study corridor currently is in a largely rural area, no vehicle charging stations are located within the alignments. However, with growth expected in the cities of Aubrey, Denton, and Celina, potential need exists for infrastructure to support electric vehicle technology.

INVEST criteria 16.3 addresses fiber networks. No fiber networks were identified within the alignment areas. However, with expected growth in the cities of Aubrey, Celina, and Denton, potential exists for increased infrastructure to support automated vehicle technology.

3.3 ECONOMIC CONDITIONS

This section discusses the employment and development within the study area.

3.3.1 Employment

3.3.1.1 Legal/Regulatory Context

Executive Order 12898 prevents disproportionately high and adverse impacts to environmental justice populations. Loss of employment to environmental justice populations could contribute to high and adverse impacts. Impacts and displacements to places of employment are subject to the same rules and regulations as other right-of-way acquisitions and fall under the protection of The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

3.3.1.2 Methodology/Research

Employment data were obtained from the 2017 NCTCOG GIS employment data. Major employers were identified using the NCTCOG Major Employers data inventory. NCTCOG identifies major employers as employment establishments with a specific minimum of 250 full-time and part-time workers. The employment figures reported are based on location rather than company-wide totals. An employment establishment may consist of a single building or a collection of adjacent buildings occupied by one employer, such as a college campus or business park.

Future employment numbers were researched through the NCTCOG 2045 demographic forecast developments. This database supplies existing and estimated numbers of employed persons filtered by traffic survey zone for 2018 and 2045.

3.3.1.3 Existing Conditions and Future Projections

Table 3.21 summarizes the 2017 employment by industry within alignment areas. There were three employers represented by two industries in the alignment areas. The number of employees per industry is summarized in Table 3.16. There are more employers immediately outside the alignment areas. However, as the alignments do not travel directly through the major centers of any of the adjacent municipalities, those employers are not included in this analysis. Locations of employment are shown in in Figure A-16 of Appendix A.

Table 3.16. Employment by Industry within Block Groups in the Study Area

Alignment	Administrative, Support, and Waste Management Services	Educational Services	Total
1	200	28	228
2	100	0	100
Total	**300**	**28**	**328**

Source: NCTCOG GIS 2017

Table 3.17 summarizes the forecasted employment growth between 2017 and 2045 for all traffic survey zones within the alignment areas. The results indicate both alignment areas are expected to see significant growth in employment from 2017 to 2045.

Table 3.17. 2018 and 2045 Employment

Alignment	2018 Employment	2045 Employment	% Increase
1	9,355	30,217	223.0%
2	4,320	18,175	320.7%

Source: NCTCOG Demographics, 2045

3.3.2 Development

3.3.2.1 Legal and Regulatory Context

There is no specific legal or regulatory context for development.

3.3.2.2 Methodology/Research

Information from the NCTCOG development monitoring database was used to obtain existing and future developments in the Denton Greenbelt Corridor area. This database tracks over 8,000 major developments that are either existing, closed, demolished, vacant, under construction, announced, or in the conceptual stages within the NCTCOG region. Developments are defined by NCTCOG as an apartment, school, or facility with over 80,000 square feet and/or 100 employees.

3.3.2.3 Existing Conditions and Future Projections

The database research found six existing developments and no closed, demolished, vacant, or proposed developments in the Denton Greenbelt Corridor area. Five existing developments are located in the Alignment 1 area and one existing development is located in the Alignment 2

area. Table 3.18 shows all the developments in the Denton Greenbelt Corridor proposed alignments. These are also shown on Figure A-17 in Appendix A.

Table 3.18. Area Development Monitoring

Alignment	Existing Developments				Proposed Developments		
	Existing	Closed	Demolished	Vacant	Announced	Conceptual	Under Construction
1	5	0	0	0	0	0	0
2	1	0	0	0	0	0	0

Source: NCTCOG GIS - *Developments, 2017*

Other factors contribute to the increased economic growth of the alignment area. As discussed previously in the demographics section (Section 3.2.3), the population in the Denton Greenbelt Corridor area is growing. With population growth comes tax base growth. Residential growth, in turn, brings commercial growth, generating an increased tax base. Section 3.3.1.3 discusses the increase in employment and commercial growth in the study area. In summary, the Denton Greenbelt Corridor study area is forecast to experience accelerated commercial growth, with employment growth occurring as high as 321 percent. These factors show the Denton Greenbelt Corridor area has a solid economic base and would continue to increase as growth continues to expand from the Dallas-Fort Worth urban core.

3.4 NATURAL ENVIRONMENTAL CONDITIONS

This section discusses the existing air quality, geology, soil, water resources, biological resources, and regulated/hazardous material sites within the proposed road alignments area.

INVEST criteria CS-03.1 addresses whether alignments overlay scenic, natural, or recreational qualities. The natural qualities component of this criteria will be addressed throughout this section.

3.4.1 Air Quality

This section presents information on regional and project-level air quality for the Denton County Greenbelt Corridor. Ozone and air quality conformity, mobile source air toxics (MSAT), and the congestion management process (CMP) are discussed.

3.4.1.1 Legal and Regulatory Context

The Clean Air Act (CAA) (42 USC. 7401–7671q and 40 CFR parts 50–99), as amended, and several other regulations regarding conformity of transportation projects are aimed at improving air quality.

The 1970 CAA granted the US Environmental Protection Agency (EPA) authority to establish National Ambient Air Quality Standards (NAAQS) for criteria air pollutants that may reasonably be anticipated to endanger public health or welfare. EPA has promulgated NAAQS for six criteria pollutants: ozone, carbon monoxide (CO), particulate matter (PM), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead (Pb). The NAAQS represent maximum allowable concentrations for the criteria pollutants, which are requisite to protect the public health and welfare with an adequate margin of safety. The EPA has identified standards for these six criteria pollutants based on specific time criteria. Table 3.19 lists each of the six criteria pollutants and their corresponding maximum threshold values.

Table 3.19. NAAQS Criteria Pollutant Maximum Thresholds

Criteria Pollutant	One-Hour Average	Three-Hour Average	Eight-Hour Average	24-Hour Average	Quarterly Mean	Annual Mean
CO	35 ppm	N/A	9 ppm	N/A	N/A	N/A
NO_2	100 ppb	N/A	N/A	N/A	N/A	53 ppb
Ozone	0.12 ppm	N/A	0.070 ppm	N/A	N/A	N/A
SO_2	75 ppb	0.5 ppm	N/A	N/A	N/A	N/A
$PM_{2.5}$	N/A	N/A	N/A	35 µg/m^3	N/A	15 µg/m^3
PM_{10}	N/A	N/A	N/A	150 µg/m^3	N/A	50 µg/m^3
Pb	N/A	N/A	N/A	N/A	1.5 µg/m^3	N/A

Source: EPA, December 2016
ppm= parts per million
ppb= parts per billion
µg/m^3 = micrograms per cubic meter

The 1990 Clean Air Act Amendments (CAAA) establishes requirements that must be met for each area that does not achieve NAAQS (nonattainment areas). The requirements are based on the severity of the air pollution problem. Transportation conformity is a CAAA requirement that calls for the EPA, US Department of Transportation, and various regional, state, and local government agencies to integrate air quality and transportation planning development processes. Transportation conformity supports the development of transportation plans, programs, and projects that enable areas to meet and maintain NAAQS for ozone, PM, and CO (40 CFR part 51 subpart T). Through the State Implementation Plan (SIP), the air quality planning process ties transportation planning to the conformity provisions of the CAAA because each regionally significant transportation project is required to conform to the EPA approved SIP (40 CFR part 51 subpart W). This ensures that transportation projects are consistent with state and local air quality objectives. NCTCOG is responsible for the conformity analysis in the Dallas-Fort Worth area.

In addition to the six criteria air pollutants listed on the NAAQS, the EPA also regulates air toxics. The EPA is the lead federal agency for administering the Clean Air Act (CAA) and has certain responsibilities regarding the health effects of MSATs. The EPA issued a Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources, 66 *Federal Register* 17229 (March 29, 2001). This rule was issued under the authority in Section 202 of the CAA. In its rule, EPA examined the impacts of existing and newly promulgated mobile source control programs, including its reformulated gasoline program, its national low emission vehicle standards, its Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, and its proposed heavy-duty engine and vehicle standards, and on-highway diesel fuel sulfur control requirements.

In an ongoing review of MSATs, the EPA finalized additional rules under the authority of CAA Section 202(l) to reduce MSAT emissions further. The EPA issued Final Rules on Control of Hazardous Air Pollutants from Mobile Sources (72 *Federal Register* 8427, February 26, 2007) under 40 CFR Parts 59, 80, 85, and 86. As a result of this review, the EPA adopted the following new requirements to significantly lower emissions of benzene and the other MSATs by lowering the benzene content in gasoline, reducing non-methane hydrocarbon exhaust emissions from passenger vehicles operated at cold temperatures (under 75 degrees), and reducing evaporative emissions that permeate through portable fuel containers.

Because the Dallas-Fort Worth metropolitan planning area (MPA) has a population over 200,000, metropolitan planning regulations [USC 134(k)(3) and 49 USC 5303(k)(3)] require the Metropolitan Transportation Plan (MTP) to include a CMP to address congestion. The CMP is a systematic process for managing traffic congestion that provides information on transportation system performance and on alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to levels that meet state and local needs. The goal of a CMP is to identify strategies that reduce single-occupant vehicle (SOV) capacity and decrease the need for additional SOV lanes within the transportation system. This regulation does not restrict the use of SOV lanes, but encourages alternate means to reduce congestion within metropolitan and non-metropolitan areas.

3.4.1.2 Methodology/Research

Air quality is monitored through air monitoring stations throughout the Dallas-Fort Worth region. Both the Texas Commission on Environmental Quality (TCEQ) and the EPA keep records of the recorded values for the air monitors. Each monitor is assigned specific air quality measures to account for from the NAAQS; most air monitors will only assess two or three air quality emissions. Air monitor location was obtained using GIS from NCTCOG. Air monitor data were obtained through TCEQ and the EPA.

Existing and future MSAT sensitive receptors were identified through numerous methods; these methods included using GIS files from NCTCOG and identifying the various sensitive receptors. Numerous air quality improvements around the Dallas-Fort Worth region are implemented through the CMP. Future MSAT sensitive receptors were those that were under construction, conceptual, and announced. NCTCOG maintains a Transportation Improvement Program Implementation System database storing all current and upcoming projects within the Dallas-Fort Worth region. CMP projects were obtained through this system.

3.4.1.3 Existing Conditions and Future Projections

NAAQS

The proposed Denton County Greenbelt Corridor is located in Collin and Denton counties, which are in the EPA designated nonattainment area for the 2008 eight-hour NAAQS for ozone; therefore, the transportation conformity rule applies. In April 2015, the EPA signed a Final Rule designating nine counties in the Dallas-Fort Worth MPA, including Denton and Collin counties, as marginal nonattainment for 2015 eight-hour NAAQs for ozone. Collin and Denton counties are in attainment for all other NAAQS.

Using information obtained from the NCTCOG GIS files, no air monitoring stations were identified in the alignment areas. The current standards for six criteria pollutants are provided in Table 3.19.

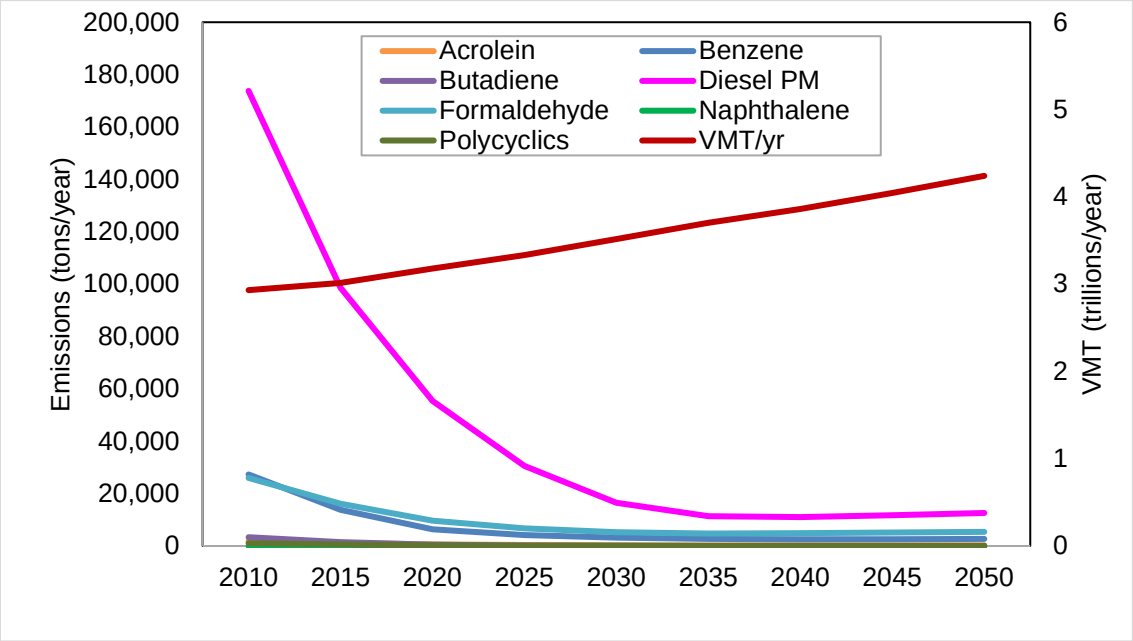
Mobility 2045: The Metropolitan Transportation Plan for North Central Texas (Mobility 2045), according to metropolitan planning regulations, must be fiscally constrained based on reasonable assumptions about future transportation funding levels. Because the Dallas-Fort Worth area is designated as a nonattainment area for the eight-hour ozone standard, the CAA require the transportation plan to be in conformity with the SIP for air quality to demonstrate that projects in the MTP meet air quality goals. Mobility 2045 specifically addresses regional ozone in addition to its studies of general regional air quality. The result showed that the 2045 regional roadway network would decrease ozone precursor emissions of nitrogen oxides and volatile organic compounds in comparison to the existing roadway network. Transportation conformity is a process that ensures federal funding and approval goes to transportation activities that are

consistent with air quality goals. Transportation activities that do not conform to state air quality plans cannot be approved or funded. Based on the efforts of regional transportation planning through the MTP, it is anticipated that further future reductions of the six NAAQS criteria pollutants may occur.

MSATs

Between 2010 and 2050, FHWA projects that even with a 45 percent increase in vehicle miles traveled, EPA regulations for vehicle engines and fuels would reduce on-highway emissions of acrolein, benzene, butadiene, formaldehyde, naphthalene, and polycyclics by 67 percent to 99 percent, and would reduce on-highway diesel particulate matter by 93 percent. These reductions are shown in Figure 3-1.

Figure 3-19. US Annual Vehicle Miles Traveled vs. MSAT Emissions, 2010-2050



Source: EPA, September 2016

The tendency for pollutant levels to drop off substantially with increased distance from the roadway is well documented. The concentrations of pollutants decrease to background levels at approximately 500 to 600 feet (EPA, 2014). The wind direction and speed, vehicle traffic levels, and roadway design can each affect the relationship between background pollution and elevated pollution levels due to proximity of a roadway.

The EPA new motor vehicle emission control standards would factor in reducing MSAT emissions across the Dallas-Fort Worth region. MSATs, especially benzene, have dropped dramatically since 1995 and are expected to continue dropping. The introduction of reformulated gasoline has contributed substantially to this improvement. In addition, Tier II automobiles introduced in model year 2004 would continue to help reduce MSATs. Diesel exhaust emissions have been falling since the early 1990s with the passage of the CAA amendments. The CAA amendments provided for improvement in diesel fuel through reductions in sulfur and other diesel fuel improvements. In addition, the EPA has further reduced the sulfur level in diesel fuel, which took effect in 2006. The EPA also has called for dramatic reductions in oxides of nitrogen emissions, and PM from on-road and off-road diesel engines.

Sensitive Receptors

Air quality sensitive receptors were considered as all schools, hospitals, elderly care facilities, and licensed daycare facilities. The EPA indicates that air quality is a concern to those within 500 to 600 feet of a roadway (EPA, 2014). Although the impact is also dependent on other factors including wind direction, traffic density, topography, other land use types in the area, and the individual pollutants that are present, a distance of 600 feet was used in this analysis.

This study identified no sensitive air receptors within 600 feet of the alignments. If the distance is increased to half a mile, there are fewer than 10 sensitive air receptors. However, research indicates at this distance from the roadway, air quality concerns are greatly diminished. NCTCOG used the Federal Highway Administration's INVEST to identify sustainability-related content to include in corridor scale studies. INVEST criteria CS-14.1 discusses identifying temporary and long-term air quality impacts of construction. The NCTCOG data did not identify any potential sensitive receptors that would be impacted in the future within either alignment.

CMP

The CMP element of the MTP carries an inventory of all project commitments detailing type of strategy, implementing responsibilities, schedules, and expected costs. At the project implementation level, travel demand reduction strategies and commitments are added to the regional Transportation Improvement Program (TIP)/Statewide Transportation Improvement Program (STIP) or included in the construction plans. The regional MTP and TIP/STIP provide for programming of these projects at the appropriate time with respect to the SOV facility implementation and project specific elements. The number of CMP projects within the proposed alignments are listed in Table 3.20. Figure A-18 in Appendix A illustrates these projects.

Table 3.29. CMP Projects by Alignment

Alignment	Number of CMP Projects*
1	6
2	5

Source: NCTCOG, TIPINS, June 2018
*Numerous individual CMP projects occurred in both alignments.

Within the alignment areas, seven CMP projects were identified. These improvements included a variety of projects, including new roadways and additions of lanes. It is expected for CMP projects to continue to increase in the alignment areas. As the Dallas-Fort Worth region continues to reduce its pollution, CMP projects will be an integral part of the solution.

3.4.2 Geology and Soils

3.4.2.1 Legal and Regulatory Context

There is no legal or regulatory context regarding geology or soil conditions.

3.4.2.2 Methodology/Research

Soils and geology located within the alignment areas are described and mapped in various publications by the Natural Resources Conservation Service (NRCS) and Bureau of Economic Geology. The alignment limits were transposed over maps from these technical resources using GIS technology and subsequently evaluated for specific soil types and geologic formations.

3.4.2.3 Existing Conditions

Geology

The proposed alignments are located in the Grand Prairie Western Timbers and the Blackland Prairies regions, according to the Bureau of Economic Geology *Physiographic Map of Texas 1996*. The western portions of the alignments in Denton County are in the Grand Prairie Western Timbers physiographic area. The eastern portion of the alignments in Denton and Collin counties are in the Blackland Prairie physiographic area.

The Grand Prairie Western Timbers is underlain by formations formed during the Paleozoic (30 percent) and the Mesozoic (70 percent) eras. The Paleozoic strata consist of Pennsylvanian marine deposits of sandstone, shale, coal, and limestone. The Mesozoic strata consist of limestone from the Lower Cretaceous marine deposits. The combination of the different sediment deposits gives this region a gently to moderately rolling topography. This type of topography is generally considered relatively low, but is higher than the Blackland Prairies.

The Blackland Prairies are underlain by formations that were formed during the Mesozoic (10 percent) and Cenozoic (90 percent) eras. The Mesozoic strata consist of Upper Cretaceous marine deposits of shale, marls, and chalks. The Cenozoic strata consist of Tertiary marine deposits. This area was shaped by marine and shore-zone processes resulting from repeated submergence and emergence of the land from the ocean.

The North Central Texas area is a historically stable tectonic region located on the easternmost margins of the Texas Craton. The western portions of the region are separated from the East Texas Embayment, a Mesozoic graben, by the Ouachita fold belt. The Ouachita system developed during Paleozoic time (around 300 million years ago) and exists now as an eroded and buried mountain range (about 8,000 feet below sea level near Dallas) that extends across the region and underlies parts of Ellis, Kaufman, Dallas, Navarro, and Collin counties.

The Balcones fault zone of the San Marcos/Austin area was the first fault zone to form in the series of now-inactive basin margin normal fault zones. The hinge line gradually moved basinward (southeast and east-southeast) and younger faulting developed coastward from the Balcones zone in response to extensional stresses related to basin filling and subsidence. As the center of Gulf Basin subsidence migrated to the southeast, away from what is now the region, the locus of faulting shifted north and east to become the Luling-Mexia-Talco fault system. Most faults of the Balcones system are east-northeast and are down-to-the-east dip-slip normal faults. Today, the North Central Texas area is generally characterized by a stable tectonic platform that has very minimal recorded seismic activity. From 1981 to 2018, there were 208 earthquakes ranging from 1.6 to 4 on the Richter scale in the metropolitan planning area of Dallas-Fort Worth. Of these, none were in Denton County or Collin County.

The Cretaceous geological group represents the different rock types that are within the alignments. Cretaceous geological groups are from the Cretaceous period of the Mesozoic era. The Cretaceous period was known for having many chalk deposits and a warm climate.

The Barnett Shale is a geological formation that consists of sedimentary rocks of Mississippian age (359 million to 318 million years ago). It is considered the largest on-shore natural gas field in the US, encompassing more than 5,000 square miles and covering at least 17 counties in North Texas, including the two counties in the project area. Gas drilling in the Barnett Shale had increased dramatically since 2002, but after peaking in 2013, production has been rapidly decreasing (Railroad Commission of Texas, 2018).

Soil

The soils of the NCTCOG region are varied in texture, composition, and character, and due to the size of the region, change widely among the various physiographic regions of North Central Texas. According to the NRCS data, there are 9,087 acres of classified soil within the alignments, with 86 different types of soils.

The Denton County Greenbelt Corridor encompasses, from west to east, the Grande Prairie, Eastern Cross Timbers, and Northern Blackland Prairies ecoregions. The Grande Prairie ecoregion in the eastern portion of the alignments contains alkaline rich dark clays with some loamy soils over limestone. The Eastern Cross timbers, in the center of the alignments is characterized by well drained, rolling hills with sandy soils in the uplands and alkaline, clay-rich bottomlands. The western side of the alignments is composed of uniform, dark carbonate-rich alkaline soils, developed on a gently sloping to level area underlain by limestones, shales, and marlstones. These Blackland Prairie soils have a high shrink-swell potential and can develop deep, large cracks.

3.4.3 Water Resources

This section discusses water quality, aquifers, watersheds, floodplains, wetlands, and waters of the US.

3.4.3.1 Legal and Regulatory Context

Water Quality

- Section 401 Water Quality Certification – Section 401 of the Clean Water Act (CWA) requires states to certify that a proposed CWA Section 404 permit would not violate water quality standards. The TCEQ issues Section 401 water quality certifications for projects prior to approval of the Section 404 permit from the US Army Corps of Engineers (USACE). There is a memorandum of agreement between Texas Department of Transportation (TxDOT), USACE, and TCEQ on Section 401 Procedures. This memorandum of agreement establishes a process for interagency cooperation and TCEQ review of individual Section 404 permit applications under Section 401 of the CWA to help maintain state water quality in Section 404 permits. If an individual permit is required, the TCEQ makes these certifications for all non-oil and non-gas projects. Initiating the Section 404 process with the USACE automatically would initiate the Section 401 certification process. One aspect of the Individual Permitting process is the requirement for Section 401 water quality certification.
- General Permit for Construction Activity Texas Pollutant Discharge Elimination System (TPDES) – For projects disturbing over one acre, TPDES General Permit No. TXR150000, under provisions of Section 402 of the CWA and Chapter 26 of the Texas Water Code, require contractors to comply with conditions in the General Permit for Construction Activity. This requires preparation and implementation of a storm water pollution prevention plan in addition to adherence to rigorous best management practices (BMPs) designed to reduce or eliminate impacts to water resources. This permit would include BMPs to control total suspended solids that could be introduced into surface water.
- TPDES Municipal Separate Storm Sewer Systems (MS4s) – The Phase II storm water rule requires operators of certain small MS4s to develop and implement a storm water program. In an effort to improve water quality in streams, lakes, bays, and estuaries, the EPA developed the storm water program to control polluted runoff from urban areas.

Phase I of the program, issued in 1990, requires municipalities with a population greater than 100,000 to develop storm water management programs. Phase II is the second stage of the

EPA storm water management program requirements. It affects many small municipalities, some counties, and other entities that operate municipal separate storm sewer systems in urbanized and other densely populated areas. TCEQ, the Phase II regulatory authority in Texas, is responsible for identifying the designated populated areas.

Each regulated small MS4 is required to submit a Notice of Intent to obtain storm water permit coverage, typically by complying with the Phase II general permit requirements. Six minimum control measures must be addressed to control polluted storm water runoff. The initial submission for permit coverage must detail the programs, activities, and measurable goals that will be implemented over the five-year permit term to comply with the permit requirements. Reports detailing the progress of the storm water management program must be submitted to TCEQ on an annual basis for the first permit term. For the MS4 in the Denton County Greenbelt Corridor, coordination with the cities of Aubrey, Celina, and Denton may be necessary.

Floodplains

As required by Executive Order 11988, signed in 1977, all federal agencies are prevented from contributing to the adverse impacts associated with the occupancy and modification of floodplains and the direct or indirect support of floodplain development, when and where a practicable alternative can be identified. The Federal Emergency Management Agency (FEMA) regulates alterations to, or development within, floodplains as mapped on FEMA Flood Insurance Rate Maps (FIRM). Additionally, communities can develop more stringent local floodplain ordinances as part of the National Flood Insurance Program, allowing reduced rates on flood insurance premiums within their jurisdiction (44 CFR 60.1).

Wetlands/Waters of the US

Wetlands/waters of the US are afforded protection under the CWA. Enforcement of the CWA falls under the jurisdiction of the EPA and USACE. The CWA regulates the discharge of dredge and fill material into waters of the US. This includes rivers, perennial, intermittent, and ephemeral streams; bogs; sloughs; lakes; on-channel ponds; and wetlands. The EPA focuses enforcement efforts on unpermitted discharges into regulated waters.

- Section 404 Permit – Section 404 of the CWA would require a permit for activities that would result in fill of jurisdictional waters of the US. These permits could be Individual Permits or General Permits. General Permits include both regional and nationwide permits. NWP 14 is intended to provide a means of permitting linear transportation projects and may apply in this case. However, all Section 404 permitting would be coordinated with the Regulatory Branch, Fort Worth District of the USACE. The USACE is responsible for confirming all jurisdictional determinations, as well as establishing the appropriate permitting avenue.
- Section 10 of the Rivers and Harbors Act of 1899 – This act prohibits the creation of any obstruction to the navigable capacity of any of the waters of the US that has not been affirmatively authorized by Congress. The construction or commencement of building any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the US, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War, is regulated under this act. This act also prohibits the excavation, fill, or any manner of alteration/modification to the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or enclosure within the limits of any breakwater, or of the channel of any navigable water of the US. Work in navigable waters must be recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning construction.

- Section 9 of the Rivers and Harbors Act of 1899 – This act prohibits the construction of any bridge, dam, dike, or causeway over or in any port, roadstead, haven, harbor, canal, navigable river, or other navigable water of the United States until the consent of Congress to the building of such structures shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of War. These structures may be built under authority of the legislature of a state, across rivers and other waterways, the navigable portions that occur wholly within the limits of a single state, if the location and plans of the structure are submitted to and approved by the Chief of Engineers and by the Secretary of War before construction is commenced. It is also required that when plans for any bridge or other structure have been approved by the Chief of Engineers and by the Secretary of War; it is unlawful to deviate from such plans either before or after completion of the structure unless the modification of said plans has previously been submitted to and received the approval of the Chief of Engineers and of the Secretary of War.
- Section 14 of the River and Harbors Act (33 USC 408) – This act prohibits any person from taking possession, or making use of for any purpose, or build upon, alter, deface, destroy, move, injure, obstruct, or impair the usefulness of any sea wall, bulkhead, jetty, dike, levee, wharf, or pier in the whole or part. The Secretary of the Army may grant permission for the temporary occupation or use of the features. The Secretary of the Army may also grant permission for the alteration or permanent occupation of use of these features.

3.4.3.2 Methodology/Research

Water Quality

To determine the existing water quality of waters within the alignments, an evaluation of the 2014 Texas Integrated Report of Surface Water Quality Inventory was completed. The report describes the status of Texas waters based on historical data on surface-water and groundwater quality; the Section 303(d) list identifies water bodies that are not meeting standards set for their use. The reports satisfy the requirements of the federal CWA for both Section 305(b) water quality reports and Section 303(d) lists. Typical information provided for individual water segments includes its water body description, classification, type, length, uses, standards not met, and concerns. This information has been summarized in the following section for the proposed alignments.

Aquifers

The purpose of the aquifers assessment is to identify the location and extent of aquifers within the alignment area. The major and minor aquifer locations identified in this report are based on the aquifer datasets created by the Texas Water Development Board in 2006.

Watershed

An inventory of watersheds within the alignments was created for this assessment. The locations and extents of watersheds were identified using the 2012 Texas Watershed Boundary Dataset Update from the US Department of Agriculture.

Floodplains

The scope of this hydrologic assessment is to create a composite Flood Insurance Rate Map for both alignment areas. The 100-year flood hazard zones within the study area were mapped using digital FIRM (DFIRM).

Wetlands/Waters of the US

The purpose of the wetlands/waters of the US investigation was to determine the location and extent of waters of the US, including wetlands within the alignments that are subject to the jurisdiction of the USACE Fort Worth District, pursuant to Section 404 of the CWA and Section 10 of the Rivers and Harbors Act. Those waters under jurisdiction of 404 of the CWA may be resources that could require mitigation and/or mitigation banking. INVEST criteria CS-02.2, which addresses aquatic resources, would provide results duplicating the material included below.

Other surface waters were identified using the National Hydrography Dataset (NHD), which is updated monthly. This dataset is limited as it does not include ephemeral streams for the NCTCOG region. As ephemeral spatial data is unavailable for the region, the stream data used in the analysis represents only the intermittent and perennial streams in the region.

3.4.3.3 Existing Conditions and Future Projections

Water Quality

There are no Texas water bodies classified as impaired by TCEQ within either alignment. The Denton County Greenbelt Corridor alignments are within the Trinity River Basin. Currently, water supplied to the area comes from surface reservoirs. There are no surface reservoirs in the alignment areas; however, the corridor is located between Lewisville Lake and Ray Roberts Lake. In addition to providing public water supply, each lake serves as a recreational area. The locations of the surface reservoirs are shown in Figure A-19 in Appendix A.

Aquifers

The primary source of groundwater for this region is the Trinity Aquifer, which is composed of various individual aquifers within the Trinity Group. There is also one minor aquifer within the alignment areas, the Woodbine Aquifer. Both alignments are within the Trinity Aquifer. The Woodbine Aquifer overlaps the eastern portions of the Trinity Aquifer and contains about 56.6 percent of both alignments. Figure A-20 in Appendix A shows the locations of identified aquifers within the alignment areas while Table 3.21 shows the area within each aquifer in each alignment.

Table 3.21. Aquifers within the Proposed Alignment Areas

	Trinity Aquifer		Woodbine Aquifer	
Alignment	Area within Alignment (square miles)	Percent of Alignment	Area within Alignment (square miles)	Percent of Alignment
1	8.6	100.0%	4.9	54.2%
2	8.6	100.0%	5.1	59.1%

Source: Texas Water Development Board, December 2006, Texas Water Development Board, December 2017

The Trinity Group aquifers are composed of gravels, clays, sands, limestones, and conglomerates of each, with a freshwater saturated thickness averaging between 600 and 1,900 feet. The water associated with this aquifer becomes slightly to moderately saline as depth increases. With increasing depth, chloride and sulfate concentrations also tend to increase. Water from these formations is primarily used for municipalities, but is also used for irrigation, livestock, and domestic purposes in north and central Texas. Extensive development of the Trinity Aquifer within the Dallas-Fort Worth region has resulted in the significant drop in historical water levels of this aquifer. The Woodbine Aquifer is a minor aquifer that overlies the

Trinity Aquifer. The downdip of this minor aquifer also overlies the alignments for this project. This aquifer is typically 600 feet in thickness with a freshwater thickness of approximately 160 feet. Water quality and yield varies with the depth of the aquifer. The lower zones of the aquifer typically yield the most water, while the upper zone yields limited water that is high in iron.

Watersheds

The Denton County Greenbelt Corridor area is located entirely within the Texas-Gulf region watershed, the Trinity subregion, the Upper Trinity basin, and the Elm Fork Trinity subbasin. The alignments can also be found in five watersheds and eight subwatersheds within the study area. A map showing the locations of the subwatershed boundaries is included in Figure A-21 in Appendix A.

Floodplains

FEMA DFIRM data for Denton and Collin counties was used to determine the portions of the alignments that are in flood hazard zones. The mapped floodplain boundaries within the study area are contained in Figure A-22 in Appendix A. Table 3.22 lists the number of acres in each alignment that lies within the mapped 100-year floodplains.

Table 3.22. FEMA 100-Year Floodplains within the Proposed Alignment Areas

Alignment	Acres within 100-Year Floodplain	Percent of Alignment within 100-Year Floodplain
1	1028.8	18.0%
2	1105.5	20.1%

Source: NCTCOG, March 2014

Wetlands/Waters of the US

Using the NHD, a total of seven named streams/rivers were found to occur within the proposed alignments. The total length of named streams/rivers within Alignment 1 is 4.5 miles, with an additional 14.4 miles of unnamed streams. Alignment 2 contains 5.2 miles of named streams, with an additional 17.1 miles of unnamed streams (see Figure A-19 in Appendix A). Table 3.23 lists the named streams and their respective lengths that are located within the alignments. As the NHD dataset does not include ephemeral streams, there is potential for the Denton County Greenbelt Corridor to have a larger impact than identified in this analysis. There are also many unnamed lakes and ponds that cover a total of 95.9 acres. These are shown in Figure A-19 in Appendix A.

Table 3.23. Named Streams within the Proposed Alignment Areas

Stream	Named Stream Length within Proposed Alignments (miles)	
	Alignment 1	Alignment 2
Aubrey Branch	1.7	1.6
Cooper Creek	0.2	0
Culp Branch	0.5	0.6
Little Elm Creek	0.6	0.6
Milam Creek	0	0.4
Mustang Creek	0.9	1.3
Pecan Creek	0.7	0.7

Source: NHD, June 2018

The determination of wetlands locations within the alignments was made based on the combination of three wetland maps, the National Land Cover Database (NLCD), Ecological Mapping Systems of Texas, and the National Wetlands Inventory. A wetland was considered present if the area was identified by any of the three data sources. This combined wetland map does not constitute a complete inventory of wetlands within the alignment areas, and field investigations in coordination with the USACE would be necessary to determine the locations and extents of affected wetlands in subsequent studies.

Table 3.24. Wetlands within the Proposed Alignment Areas

Alignment	Total Wetlands (acres)
1	75.5
2	63.4

Source: NLCD 2011, NWI 1979, EMST 2009-2014

There are no water crossings within the proposed alignments that are considered navigable by the US Coast Guard. To maintain compliance with Section 10 and Section 14 of the Rivers and Harbors Act of 1899, coordination and authorization for crossing the Trinity River would be required prior to construction. The water bodies and wetlands within the proposed alignment areas are illustrated in Figure A-23 in Appendix A.

Stormwater Assets

NCTCOG used the Federal Highway Administration's INVEST to identify sustainability-related content to include in corridor-scale studies. INVEST criteria CS-15.3 calls for a high-level analysis of how alignments may utilize current stormwater assets. The city of Denton maintains an online GIS viewer with this information; Denton County provided spatial data for this analysis.

City of Denton: In the western portion of Alignment 1, an inlet and an outfall are located on Loop 288 near the intersection with Sherman Road. Traveling northeast along Sherman Road, several inlets exist at an athletic complex. Farther northeast along Sherman Road, several drainage streams occur. In the western portion of Alignment 2, two outfalls exist south of the intersection of IH 35W and Milam Road. Traveling east on Milam Road, several drain streams

are located near the corridor. Where both alignments intersect the Denton Greenbelt, a drainage stream exists.

Denton County: In the western portion of Alignment 2, a culvert exists along Milam Road just east of IH 35. In both alignment areas, a culvert exists north of FM 428 and west of Aubrey before the alignments diverge.

3.4.4 Biological Resources

This section discusses three aspects of biological resources: vegetation, wildlife, and threatened and endangered species.

3.4.4.1 Legal and Regulatory Context

Vegetation

With the exception of certain vegetation communities that afford habitat to species listed under the Endangered Species Act (i.e., critical habitat), impacts to vegetation communities are generally not regulated under federal or state law. However, there are some guidance documents that govern how impacts to vegetation communities are to be documented and mitigated.

- The Fish and Wildlife Coordination Act requires coordination with the US Fish & Wildlife Service when a federal project would modify a water body. The principal purpose of the regulation is to encourage communication among the USFWS and other agencies to identify ways in which wildlife resources can be conserved.
- The Executive Memorandum dated April 29, 1994, on Beneficial Landscaping Practices was published in the August 10, 1995, *Federal Register*. It requires that all agencies comply with National Environmental Policy Act (NEPA) as it relates to vegetation management and landscape practices for all federally assisted projects. The Executive Memorandum directs that where cost-effective and to the extent practicable, agencies will use regionally native plants for landscaping; design, use, or promote construction practices that minimize adverse effects on the natural habitat; seek to prevent pollution by, among other things, reducing fertilizer and pesticide use; implement water-efficient and runoff-reduction practices; and create demonstration projects employing these practices.
- Executive Order 13112 on Invasive Species requires that federal agencies identify actions that can affect the disposition or introduction of invasive species, use relevant programs to prevent the introductions of such species, control invasive species, monitor known populations of invasive species, and restore areas that have been affected by such species.
- TPWD and TxDOT have an interagency agreement in the form of a memorandum of understanding (1998) and a memorandum of agreement (2001 and 2005). The memorandum of understanding states any mitigation, regulatory or non-regulatory (i.e., non-regulatory mitigation is mitigation that is driven by TxDOT policy rather than a state or federal regulation such as Section 404 of the CWA), would be coordinated with TPWD and USFWS in accordance with the memorandum of understanding and other applicable laws (i.e., Fish and Wildlife Coordination Act).

Wildlife

Several laws and regulations govern impacts to wildlife resources, most notably the Migratory Bird Treaty Act of 1918, Fish and Wildlife Coordination Act of 1958, the Endangered Species Act of 1973, and the Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended. The Migratory Bird Treaty Act implemented a treaty that was signed by the US, Japan, Canada, Mexico, and Russia. The law affords protection to virtually all migratory birds,

including their parts, nests, or eggs. The Migratory Bird Treaty Act affords protection to over 800 species in total. The Fish and Wildlife Coordination Act requires federal agencies to solicit comments from both the USFWS and the state agency (i.e., TPWD) regarding the impacts of federal actions on wildlife species. The Magnuson-Stevens Fishery Conservation and Management Act is the authority for all fishery management activities and regulates essential fish habitat. The Magnuson-Stevens Fishery Conservation and Management Act is implemented by the National Marine Fisheries Service.

Threatened and Endangered Species

The Endangered Species Act of 1973, as amended, prohibits the "taking" of listed species and the destruction of habitats critical to the survival of federally listed species. The designation of "endangered" indicates that the entire species appears to be in danger of extinction. A designation of "threatened" indicates a species for which protective measures appear to be required to prevent it from becoming endangered. The word "take," according to the 50 CFR 17.3, includes "harass, harm, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." In this context, "harm" means an act that actually kills or injures protected wildlife. This has been interpreted to include substantial habitat modification or degradation that results in actual injury or death to listed species (i.e., impairment of essential behavior patterns).

The Bald and Golden Eagle Protection Act (16 USC 668-668d) of 1940, as amended, gives protection to Bald and Golden Eagles (*Haliaeetus leucocephalus* and *Aquila chrysaetos*) similar to the Endangered Species Act. Because the bald eagle was removed from the federal threatened and endangered list (effective August 8, 2007), these birds are now afforded protection under the Bald and Golden Eagle Protection Act, which prevents a person to "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or in any manner, any bald eagle…[or any golden eagle], alive or dead, or any part, nest, or egg thereof." The act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." It further defines "disturbed" as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

Somewhat similar legislation [i.e., Section 65.171-176 and 69.01-69.9 of the Texas Administrative Code] has been passed by the State of Texas appointing TPWD the responsibility of listing species within the state. In addition, the Parks and Wildlife Code, Chapters 68 and 88 for the state of Texas contain the regulations of endangered species and plants. Both the state and federal laws afford protection to the organism from direct taking. However, state laws do not include prohibitions on impacts to habitat, only to activities that would directly impact a listed species.

3.4.4.2 Methodology/Research

Research for the existing conditions was conducted through GIS. Data for vegetation were obtained from TPWD and based on the Vegetation Types of Texas and TPWD ecoregions. Potential threatened and endangered species as well as species of concern were obtained through the Natural Diversity Database (NDD) from TPWD. This database tracks confirmed sightings and locations of threatened and endangered species (as well as candidate species), species of concern, and special habitat series.

Existing conditions of wildlife are difficult to obtain without extensive field investigations throughout the Denton County Greenbelt Corridor area. Because of the inability to conduct these surveys, habitat was used as a proxy for wildlife. In general, the type of species that occur within an area is based on the type of habitat present. In addition, areas of high degree of human activity exhibit less diversity and have a lower habitat value to wildlife than undisturbed habitats. Evaluation of areas of human disturbance was derived from the land use section, Section 3.2.1.

Future conditions for all biological resources were based on existing trends in development discussed in previous sections.

NCTCOG used the Federal Highway Administration's INVEST to identify sustainability-related content to include in corridor-scale studies. Light pollution and habitat connectivity are important factors to consider when prioritizing conservation of biological resources. Data from the US Geological Survey Protected Areas Database identified areas in the alignments that may be negatively impacted by light pollution. Areas of ecological connectivity were identified using EPA's National Ecological Framework.

3.4.4.3 Existing Conditions and Future Projections

Vegetation

The alignment areas contains two major ecological areas, the Blackland Prairies on the east and the Cross Timbers and Prairies on the west. The alignments are further defined into three ecoregions: Eastern Cross Timbers, Grand Prairie, and the Northern Blackland Prairie.

Nine vegetation types from the *Vegetation Types of Texas* were identified in the alignments. Table 3.25 lists the acreage of vegetation type by alignment and Table 3.26 lists all the vegetation types and how much percentage of coverage each has in either alignment. Figure A-24 in Appendix A also shows the vegetation types.

Table 3.25. Acreage of Vegetation Types by Proposed Alignment

Alignment	Silver Bluestem-Texas Wintergrass Grassland	Post Oak Woods, Forest and Grassland Mosaic	Crops	Other Native or Introduced Grasses	Urban	Water
1	1,584	407	982	1,958	624	171
2	1,929	319	983	2,106	--	168

Source: TPWD GIS: Vegetation Types of Texas, April 2018

Table 3.26. Vegetation Types in the Proposed Alignments

Vegetation Type	TPWD Vegetation Type Code Number	Percent of Alignments
Silver Bluestem-Texas Wintergrass Grassland	4	31.3
Post Oak Woods, Forest and Grassland Mosaic	30b	6.5
Crops	44	17.5
Other Native or Introduced Grasses	45	36.2
Urban	46	5.6
Water	47	3.0

Source: TPWD GIS: *Vegetation Types of Texas*, April 2018

The majority of the alignments would fall into the "other native or introduced grasses" and "Silver Bluestem – Texas Wintergrass grassland" categories with approximately 36.2 percent and 31.3 percent, respectively. Forested areas accounted for approximately 6.5 percent of the alignments while grassland types covered approximately 67.5 percent of the alignments. Table 3.27 describes the typical vegetation species found in each vegetation type and where the distribution of the vegetation type occurs.

Table 2.37. Typical Vegetation Type and Distribution

Vegetation Type/Code Number	Commonly Associated Plants		Distribution
Silver Bluestem-Texas Wintergrass Grassland (4)	• Little Bluestem • Sideoats Grama (*Bouteloua curtipendula*) • Texas Grama (*Bouteloua rigidiseta*) • Three-Awn, Hairy grama (*Bouteloua hirsuta*) • Tall Dropseed (*Sporobolus asper*) • Buffalograss • Windmillgrass • Hairy Tridens (*Tridens pilosus*)	• Tumblegrass (*Schedonnardus paniculatus*) • Western Ragweed (*Ambrosia psilostachya*) • Broom Snakeweed (*Gutierrezia sarothrae*) • Texas Bluebonnet (*Lupinus texensis*) • Live Oak, Post Oak (*Quercus stellata*) • Mesquite	Primarily in the Cross Timbers and Prairies
Post Oak Woods, Forest and Grassland Mosaic (30b)	• Blackjack Oak • Eastern Red Cedar (*Juniperus virginiana*) • Mesquite • Black Hickory (*Carya texana*) • Live Oak • Sandjack Oak (*Quercus incana*) • Cedar Elm • Hackberry • Yaupon (*Ilex vomitoria*) • Poison Oak (*Toxicodendron* sp.) • American Beautyberry (*Callicarpa americana*) • Hawthorn (*Crataegus* sp.) • Supplejack (*Berchemia* sp.)	• Trumpet Creeper (*Campsis radicans*) • Dewberry (*Rubus* sp.) • Coral-Berry (*Symphoricarpos orbiculatus*) • Little Bluestem • Silver Bluestem • Sand Lovegrass (*Eragrostis trichodes*) • Beack Panicum (*Panicum anceps*) • Three-Awn • Spranglegrass (*Uniola sessiliflora*) • Tickclover (*Desmodium* sp.)	Most apparent on the sandy soils of the Post Oak Savannah.

Vegetation Type/Code Number	Commonly Associated Plants	Distribution
Crops (44)	Cultivated cover crops or row crops providing food and/or fiber for either man or domestic animals. This type may also portray grassland associated with crop rotations.	Statewide
Other Native or Introduced Grasses (45)	Mixed native or introduced grasses and forbs on grassland sites or mixed herbaceous communities resulting from the clearing of woody vegetation. This type is associated with the clearing of forests in northeast and east-central Texas and may portray early stages of Type 41, Young Forest. Also occurs in the South Texas Plains where brush has been cleared. Such areas are particularly subject to change due to regrowth brush.	Primarily northeast, east-central and south Texas
Urban (46)	Urban vegetation types as usually associated with landscaped and ornamental species planted in urban areas. This could also include maintained grasses along roadside right-of-ways and in urban ditches.	Statewide
Water (47)	Water is defined as any large body of water such as lakes. These areas may contain fringe obligate plants and other underwater aquatic plant species.	Statewide

Source: Vegetation Types of Texas, 1984

As stated in previous sections, growth would continue to occur in the area surrounding the alignments as the population of the Dallas-Fort Worth area expands from the central core. As the population pushes outward, these natural areas would be impacted and converted to a more urbanized setting.

Wildlife

According to the World Wildlife Fund, over 500 species of wildlife inhabit the Texas Blackland Prairie that includes the two major ecological areas of the Blackland Prairie and the Cross Timbers regions. This general area supports a wide array of habitat as identified in the vegetation section.

Land use data (2015) were used to determine the amount of human disturbance within the alignments that could affect wildlife habitat. This information was used because it represents the most recent available data for determining land use and potential vegetation cover in the study area. According to Section 3.2.1.3, over 87 percent of the alignment areas are undeveloped land (this land includes farmland, ranch land, timberland, and improved acreage) and one percent was defined as water. Over 11 percent of the alignment area was developed as residential, commercial, industrial, etc. Based on this information, some of the alignment area contains some open and undisturbed land that could support high species diversity. Most of the current habitat fragmentation was occurring from farming and ranching operations. Future habitat is expected to decline as the growth continues in the areas surrounding the alignments. As the area experiences increased development, habitat loss and habitat fragmentation would increase from the existing conditions.

Threatened and Endangered Species

Eighteen taxa are listed by the federal and/or state government agencies as occurring, potentially occurring, or historically occurring in the two counties traversed by the proposed alignments. These taxa are shown in Table 3.28.

Table 3.28. Federal/State Listed Species for the Proposed Alignments

Common Name	Scientific Name	Federal Status	State Status
Birds			
American Peregrine Falcon	*Falco peregrinus anatum*	DL	T
Arctic Peregrine Falcon	*Falco peregrinus tundrius*	DL	
Bald Eagle	*Haliaeetus leucocephalus*	DL	T
Interior Least Tern	*Sterna antillarum athalassos*	E	E
Peregrine Falcon	*Falco peregrinus*	DL	T
Piping Plover	*Charadrius melodus*	T	T
Red Knot	*Calidris canutus rufa*	T	
White-Faced Ibis	*Plegadis chihi*	--	T
Whooping Crane	*Grus americana*	E	E
Wood Stork	*Mycteria americana*	--	T
Mammals			
Red Wolf	*Canis rufus*	E	E
Mollusks			
Louisiana pigtoe	*Pleurobema riddellii*	--	T
Sandbank pocketbook	*Lampsilis satura*	--	T
Texas heelsplitter	*Potamilus amphichaenus*	--	T
Texas pigtoe	*Fusconaia askewi*	--	T
Reptiles			
Alligator Snapping Turtle	*Macrochelys temminckii*	--	T
Texas Horned Lizard	*Phrynosoma cornutum*	--	T
Timber/Canebrake Rattlesnake	*Crotalus horridus*	--	T

Source: USFWS, April 2018; TPWD, April 2018
E = Endangered, T = Threatened, DL = Delisted or proposed for delisting

The NDD provides actual recorded occurrences of protected species and vegetation series throughout the state of Texas. These elements of occurrences are kept in the NDD database to reference known sightings and locations of protected species and vegetation series. Searches in the NDD yield a GIS shapefile that maps a general area where the element of occurrence was documented. With this information, these areas can be investigated further to confirm the presence of the documented species or vegetation series and avoided whenever possible.

A search through the NDD from TPWD was conducted for the Denton County Greenbelt Corridor area for potential threatened and endangered species, species of concern, protected species, and vegetation series. The search yielded no occurrences within the alignments. However, to the northwest of the alignment, within Denton County, Little Bluestem-Indian grass series (*Schizachyrium scoparium-Sorghastrum nutans Series)*, a protected plant series, could be found. In addition, eight species had occurrences in the areas surrounding the proposed alignments, including four vegetation species and four animal species.

As stated in previous sections, growth surrounding the alignments could decrease vegetation and species habitat. As this habitat degrades, these protected species and vegetation series could become removed from the alignment areas. There is potential that a continued decline of protected species and vegetation series could occur within the alignment areas.

Light Pollution and Ecological Connectivity

Light sensitivity is addressed in INVEST criteria CS-05.1. There is one light sensitive area in the alignments, represented by the Ray Roberts State Park. Alignment 1 and 2 overlap in the section that crosses the state park and covers 66.4 acres.

The National Ecological Framework, developed by EPA, models connectivity of landscapes in the United States. It identifies priority ecological areas (hubs), how they could be connected through a computer-based least-cost analysis (corridors), and supplemental terrestrial and hydrological connections (auxiliary connections). Protecting these features could prevent fragmentation and maintain ecologically viable systems. Prioritizing these areas for conservation may help to increase ecological connectivity and decrease ecological disturbance. INVEST criteria CS-02.3 addresses ecological connectivity. The connectivity result of the alignments has been identified in Table 3.29 and are displayed in Figure A-25 in Appendix A.

Table 3.29. National Ecological Framework Connections

Alignment	Hubs		Corridors		Auxiliary Connections	
	Number	Acres	Number	Acres	Number	Acres
1	0	0	2	874.3	13	1110.4
2	0	0	2	871.3	19	1266.4

Source: EPA, 2013

INVEST criteria CS-02.4 seeks to identify alignments that may require a site-specific ecological assessment during NEPA. Both alignments may require this assessment because they cross a state park and conserved area that serve as a wildlife corridor between two reservoirs.

3.4.5 Infrastructure Resiliency

3.4.5.1 Legal and Regulatory Context

Under the Fixing America's Surface Transportation Act, state and metropolitan planning organizations are required to consider resiliency in the transportation planning process. Resiliency is defined as the "ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions" (FHWA, 2017). Under the new requirement, planning should include consideration of improving the reliability and resiliency of the transportation system, consultation with applicable natural disaster risk reduction agencies when developing the MTP and TIP, and assessment of strategies that reduce vulnerability of the existing transportation infrastructure from natural disasters in the MTP.

INVEST criteria CS-17.1 addresses infrastructure resiliency by considering incorporating climate change or extreme weather impacts into the study. Tree canopy, which may help to mitigate for urban heat island effect, flood potential, and shrink-swell potential of soils are aspects that may be considered when evaluating infrastructure resilience and are addressed below.

Related to infrastructure resiliency, INVEST criteria CS-17.2 addresses how alignments are compatible with hazard mitigation plans of state and local agencies and jurisdictions, while criteria CS 17.3 addresses engagement with stakeholders that are associated with hazard mitigation such as USACE, Texas Water Development Board, TCEQ, EPA, and local and county officials. These two criteria will also be addressed in this section.

3.4.5.2 Methodology/Research

The susceptibility of the alignments to extreme weather conditions were analyzed using tree canopy, low water crossings, and floodplains to estimate flood potential, and the shrink-swell potential of soils.

Data from the 2011 NLCD was used to determine the acres of tree canopy within the alignments. Low water crossings are determined using 2015 NCTCOG low-water crossing data. The shrink-swell potential of soils in the alignments was evaluated using NRCS Web Soil Survey.

INVEST criteria CS-17.2 will be addressed using hazard mitigation plans from Denton and Collin counties.

3.4.5.3 Existing Conditions and Future Projections

The acreage of tree canopy in both alignments cover less than 15 percent of each alignment area, with Alignment 1 having more canopy than Alignment 2. This result reflects the dominant land use in the area, which is ranch and farmland. These results are shown in Table 3.30.

Table 3.30. Tree Canopy

Alignment	Acres	Percent of Alignment
1	721.1	12.6%
2	466.3	8.5%

NLCD, 2011

NCTCOG data found that there were no low-water crossings in either alignment.

The potential for flooding should also be evaluated when considering infrastructure resiliency within the alignment. Table 3.31 indicates that approximately 18 percent and 20.1 percent of Alignment 1 and 2, respectively, are within the 100-year flood plain. The alignments are also located downstream of Lake Ray Roberts Dam, which may need to be considered in future studies.

The linear extensibility percent was used to determine the shrink-swell potential of soils. This percent is the change in length as the moisture content of a soil changes from a moist to dry state. A higher percent indicated a higher potential for shrink-swell in soils. This is closely linked to the percentage of clay in soil, with a higher percentage indicating a higher potential for shrink-swell. The shrink-swell potentials are shown in Table 3.32.

Table 3.31. Soil Shrink-Swell Potential

Shrink-Swell Potential	Linear Extensibility Percent	Percent Clay
Low	<3.0	<25
Moderate	3.0- 5.9	25-35
High	6.0-8.9	35-45
Very High	≥9.0	>45

National Soil Handbook, NRCS June 2018

The NRCS data found some variation to the distribution of shrink-swell potential of soils within the alignments. For both alignments, over 40 percent of the alignment area had soils of low shrink-swell potential, with most of these soils falling in the center of the alignments. Another approximately 40 percent of the alignment areas had high or very high potential. The remaining approximately 14 percent of alignment areas had soils having moderate shrink-swell potential. The acres of shrink-swell potential of soils is summarized in Table 3.32 and in Figure A-27 in Appendix A.

Table 3.32. Distribution of Soil

Alignment	Shrink-Swell Potential	Acres
1	Low	2541.4
	Moderate	829.1
	High	1374.9
	Very High	979.7
2	Low	2327.1
	Moderate	769.3
	High	1428.3
	Very High	978.7

NRCS, 2018

The Denton County, Texas Hazard Vulnerability Analysis (HVA) 2010 identifies strategies to address hazards that create risks in the county. The alignments included in the feasibility study are largely located in Denton County. Some of the hazards and strategies addressed in the plan have implications for transportation infrastructure:

- Development resulting from projected population increases will require the county to address land use and the impact of hazards.
- The county's Flood Damage Prevention Ordinance identifies five methods to reduce flood losses; all of the methods are applicable to transportation infrastructure. The methods address impacts on flood heights or velocities, land uses that are vulnerable to floods, alterations of floodplains and stream channels, dredge and fill that could increase flooding, and the construction of barriers that divert flood waters.
- Texas Department of Transportation can sand state highways and interstates during winter storms.
- Close supervision of construction digging can prevent ruptures of oil and gas pipelines.
- Hazardous materials can travel the county's roads, even though the county has no hazardous material roadway routes. The HVA identifies a 1,000-foot risk zone on the sides of roadways and a 3,000-foot risk area for large spills of dangerous goods and hazardous materials.

The Collin County Hazard Mitigation Action Plan from 2015 covers the city of Celina, part of the Denton County Outer Loop corridor. The plan cites the hazards of expansive soils and winter storms as having implications for roads. Roads and other impervious surfaces are identified as factors affecting flash floods. The alignments' compatibility with these considerations varies:

- Development: The Denton County Outer Loop/Greenbelt Parkway will meet traffic demands generated by expected development. However, the roadway may generate additional changes in land use, creating a hazard mitigation concern.

- Flooding: Appropriate stormwater infrastructure and compensatory mitigation will be necessary to mitigate impacts to flood heights or velocities, alterations of floodplains and stream channels, dredge and fill, the construction of barriers, and effects on flash floods.
- Water quality: Appropriate stormwater infrastructure will be necessary to mitigate for sanding during winter storms.
- Oil and gas pipelines: The Denton Greenbelt Corridor has approximately 17 miles of pipeline present carrying natural gas, natural gas liquids, and gasoline. More information can be found in Section 3.2.8.3.
- Hazardous materials: Roadways designed with modern safety considerations could reduce the risk of accidents that could cause hazardous material spills. Stormwater management structures are not designed to treat the volume of hazardous materials that could be spilled during an accident.
- Expansive soils: Design and construction phases will need to consider the presence of high and very high shrink-swell potential in the soil underlying the alignments.

NCTCOG has identified the following agencies that could be stakeholders in identifying hazards in the corridor:

- Texas Floodplain Management Association
- Texas Water Development Board
- FEMA
- TCEQ
- Local Emergency Planning Committee, Denton County
- Railroad Commission of Texas
- Natural Resources Conservation Service

3.4.6 Regulated/Hazardous Materials

3.4.6.1 Legal and Regulatory Context

A hazardous/regulated materials assessment is the first step in the environmental due diligence process. Environmental due diligence is performed on a property to identify and evaluate the potential for environmental contamination and to assess the potential liability for contamination present at the property. In November 2006, the EPA issued the final *All Appropriate Inquiries (AAI) Rule - Environmental Site Assessments, Phase I Investigations* that established the specific regulatory requirements and standards for conducting AAI to qualify for one of the three landowner liability protections under the Comprehensive Environmental Response, Compensation, and Liability Act Brownfields Amendments. The purpose of a Phase I Environmental Site Assessment is to identify Recognized Environmental Conditions (REC) associated with the subject property. A REC is the presence or likely presence of any hazardous substances or petroleum products on the subject property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the subject property or into the ground, groundwater, or surface water of the subject property. The term does not include: "…de minimis conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies" (American Society for Testing and Materials E 1527-05 2005).

3.4.6.2 Methodology/Research

The hazardous/regulated materials investigation was conducted to identify the known presence or likely presence of any hazardous substances or petroleum products on any property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into the ground, ground water, or surface water within the alignment areas. Regulated/hazardous material waste sites include any business or facility that uses or handles materials that are regulated such as gas stations, dry cleaners, and auto repair shops.

GIS data from NCTCOG, TCEQ, and United States Geological Survey (USGS) provided information regarding potentially hazardous sites. These include the location of closed and active superfund sites, unauthorized and authorized landfill sites, mining areas, and radioactive sites.

3.4.6.3 Existing Conditions and Future Projections

Data were obtained from NCTCOG, TCEQ, and USGS for potential hazardous materials sites. Although this information identified potential areas, actual contamination of soil and/or ground water would not be determined until field investigations would occur during the environmental phase of the Denton County Greenbelt Corridor project.

Four types of hazardous materials were investigated by this method: radioactive sites, superfund sites, landfills, and mining areas. These types of hazardous materials do not encompass all the types that could occur, but represent all the data that is readily available for the Denton County Greenbelt Corridor area. Other types of potential hazardous sites that were not available in the research include leaking petroleum tanks, Resource Conservation Recovery Act (RCRA) small and large quantity generators, Emergency Response Service spills, and other various hazardous materials sites. The results identified no known regulated materials sites within the proposed alignments. The city of Denton landfill is located within a half mile of Alignment 1, but all other regulated materials sites in the surrounding area are located several miles away from either alignment.

As the population increases in the Denton County Greenbelt Corridor, more regulated waste would potentially be created. This could include legal waste generators (RCRA), petroleum storage tanks such as gas stations (which could leak), landfills, mining sites, and accidental hazardous spills.

4.0 TRANSPORTATION SYSTEM

This chapter discusses the existing transportation systems and planned improvements.

4.1 EXISTING TRANSPORTATION SYSTEM

The existing transportation system in the Dallas-Fort Worth region is extensive. It is composed of roadways, truck facilities, railroads, airports, transit services, bicycle/pedestrian/equestrian facilities, and safety and security elements. This section discusses current transportation system conditions in the study area in northern Denton County.

4.1.1 Roadway

The roadway network within the study area is primarily comprised of Interstate highways, other federal and state principal highways and arterials, and tollways.

4.1.1.1 Interstate Highway System

The study area is bisected by IH 35. The IH 35 facility, along with branch routes IH 35E and IH 35W, is a major north-south corridor providing direct access to the central business districts of Dallas and Fort Worth. These facilities carry a high volume of Interstate and international movements of people and goods, while also serving intra-regional traffic. Interstate highways are higher-speed roadways with no at-grade intersections with other roads or railroads. The crossing of other routes is achieved with grade separations either in the form of underpasses or overpasses. Access to and from Interstate highways is controlled using entrance and exit ramps at specific locations only.

4.1.1.2 Principal Highways

One principal US highway and one tollway travels through the study area: US 377 and the Dallas North Tollway. In addition, US 380 is an important regional arterial which operates four to six miles south of the study area.

US 377 is a highway running from north to south that serves the central portion of the study area that provides direct access to the Denton central business district. The Dallas North Tollway provides north-south access to the Dallas central business district from the eastern portion of Denton County and the western portion of Collin County. US 380 is the predominant east to west arterial through the center of Denton County, carrying large volumes of local and through traffic.

4.1.1.3 Regional Arterial System

Many regional arterial roadways traverse the study area. These arterials consist of Farm-to-Market roads and a State Loop. The Farm-to-Market facilities include FM 428, FM 1385, FM 2931, FM 3524, FM 2164, and FM 3163.

FM 428 is prominent within the study area, linking the city of Denton to Aubrey, Pilot Point (via US 377), and northern Collin County. FM 2931 and FM 1385 run southward from the study area towards high residential growth along the US 380 corridor. Also within the study area is SL 288, a highway that circumnavigates the northern and eastern sections of the city of Denton.

4.1.2 Bicycle, Pedestrian, and Equestrian

Active transportation benefits all road users and creates livable, safe, cost-efficient communities. The region's active transportation network is used as a mode of transportation by people of all ages and abilities to walk and bicycle. The network is composed of shared-use paths or trails that are shared by both bicyclists and pedestrians and is physically separated

from motorized vehicular traffic by an open space or barrier, and either in the road right-of-way (sidepath) or within an independent right-of-way. The network also includes on-street bikeways, such as separated or protected bike lanes/cycle tracks, striped bike lanes, and marked shared lanes. This network is used for non-recreational trips and a variety of purposes such as traveling to work or school, and as first/last mile connections with transit services, including bus stops and rail stations. Many cities and counties in the region have developed and adopted bicycle master plans, trail master plans, or a combination of both to encourage bicycling and walking as a form of transportation.

Several trails have been identified within the locally adopted bicycle master plans in Denton County. *Mobility 2045: The Metropolitan Transportation Plan for North Central Texas (Mobility 2045)* identifies a future trail parallel to Mustang Creek west of FM 1385 and a future trail along Little Elm Creek east of FM 1385 in the unincorporated area east of Aubrey (see Figure A-28 in Appendix A). Although the trails within the corridor are planned, the trails' crossing of a major roadway within the corridor must be taken into consideration. Another trail within the corridor is The Greenbelt Trail, which also serves equestrians.

In addition to the future trails, the existing Greenbelt Trail, which is approximately 10 miles in length, connects the Greenbelt Corridor Park located on the north side of US 380 to Lake Ray Roberts. The Greenbelt Trail is generally parallel to the Elm Fork of the Trinity River and is composed of both a paved concrete trail and a natural caliche surface trail suitable for walking, bicycling, and horseback riding. The trail is paved from US 380 to a point approximately four miles north, while the remaining six miles from the end of the paved trail north to Lake Ray Roberts is composed of natural caliche surface. The natural surface section of the trail is considered 'planned' in the active transportation network identified by Mobility 2045 but is anticipated to be paved in the future. There is an access point to the Greenbelt Trail where the natural surface trail section crosses on the northside of FM 428. The trail utilizes a historic rail bridge that runs parallel on the north side of FM 428 to cross over the Elm Fork Trinity River. This trail is utilized by many users including pedestrians, bicyclists, and equestrians.

4.1.3 Transportation System Safety and Freeway Management

The goal of the North Central Texas Council of Governments' (NCTCOG) Transportation System Safety Program is to improve transportation safety by supporting planning efforts to develop safety policies, programs, and projects related to pedestrians, bicycling, transit, roadways, and highways. Some of these current programs include:

- Freeway Incident Management – NCTCOG hosts training for agencies responsible for managing and clearing traffic incidents to significantly reduce the length and size of roadway closures. By coordinating the response to traffic incidents, interagency partnerships are fostered, emergency personnel safety is enhanced, upstream traffic accidents are reduced, and air quality and transportation system efficiency is improved.
- Railroad Crossing Reliability Partnership Program – Local, state, and federal government agencies are teaming together to improve rail crossings throughout the region. This program includes a public outreach initiative to increase public awareness and education about safety at railroad crossings.
- Truck Lane Restriction Study – As mentioned in Section 4.1.2, the region has been studying and implementing truck lane restrictions to help address the safety of truck and automobile interactions on regional highways.

Traffic monitoring and incident detection/response systems are operating on portions of the freeway system in Collin, Dallas, Denton, and Tarrant Counties. Intelligent Transportation Systems (ITS) components of the Texas Department of Transportation (TxDOT) traffic

management centers include closed circuit television, lane control signals, dynamic message signs, ramp meters, mobility assistance patrols, and vehicle detectors on limited-access facilities. TxDOT, the North Texas Tollway Authority, Dallas Area Rapid Transit, Trinity Metro, Denton County Transit Authority, and Dallas Fort Worth International Airport, as well as Dallas and Tarrant counties, are continuously installing communication infrastructure throughout the Dallas-Fort Worth region. While there appears to be a clustering on dynamic message signs and closed circuit television components along radial and circumferential freeways, it is not currently possible to provide a composite inventory or map of the various existing or proposed ITS components that have been, or will be, implemented by these entities.

INVEST criteria CS-09.2-CS-09.4 address safety in the corridor. The Denton Greenbelt Corridor is included in both the NCTCOG region's 10-Year Plan of Projects and Mobility 2045. Selection criteria for projects in the 10-year plan include Moving Ahead for Progress in the 21st Century Act goals, Texas Bill 20 Criteria, and Mobility 2040 Performance Measure Criteria, all of which include safety or crash rate.

Mobility 2045 includes several safety-related analyses. Through the Regional Safety Information System, NCTCOG completes an analysis on crash rate by county and for the region. The results show Denton County, where a majority of the alignment areas are located, had a crash rate of 71.54 crashes per 100 million vehicle miles traveled. Collin County had a crash rate of 50.23. As the regional crash rate was 71, Denton County was higher than average, while Collin County was below average.

Mobility 2045 also analyzes the density of bicycle and pedestrian crashes in the region from 2012 to 2016. Approximately 3.30 miles of Alignment 1 from east of Bonnie Brae Street along Loop 288 to north of Hartlee Field Road along FM 428 are in a low crash density zone. The other portions of either alignment within an urbanized area did not have a measurable crash density. It is important to note that this analysis was only completed for the urbanized area, which a majority of both alignments fall outside of. As a result, the density of crashes in the rural portions of the alignments are not accounted for in these analyses. Bicycle and pedestrian crashes are also more likely to occur in areas with business or employment centers and along major arterial roadways. With the increase in development expected in the region, including in Denton and Collin counties, there is potential for the bicycle and pedestrian crash density to increase.

Using 2010-2018 TxDOT's Crash Records Information System data, the number of and primary contributing factor for crashes from 2010 to 2018 in the alignment areas were identified. Alignment 1, of which the western portion travels through a more urban area, has almost 1,000 more crashes compared with Alignment 2. The most common reason for crashes was improper driving, accounting for 38 percent of the reason in Alignment 1 and 35 percent of the reason in Alignment 2. Improper driving includes factors such as disregard for signs and following too closely as well as improper turns, parking, passing, and speed.

Because crash rates in the alignment areas are relatively low and general safety campaigns already exist, such as NCTCOG's Look Out Texans, no need for a safety public awareness campaign was identified for the corridor.

Quantitative methods identified the number of and primary contributing factors for crashes in the alignment areas. These results are seen in Table 4.1.

Table 4.1. Contributing Factors to Crashes

Primary Contributing Factor	Alignment 1	Alignment 2
Animal on Road	12	9
Distracted Driving[1]	68	25
Improper Driving [2]	484	105
Other	23	7
Under the Influence	24	7
Vehicle Issues	7	1
Not Available	653	149
Total	1271	303

TxDOT Crash Records Information System 2010-2018
[1] Includes cellphone use, inattention, fatigue
[2] Includes improper passing/parking/turning, failure to yield, disregard of signs/signals, etc.

4.1.4 Transportation System Security

Transportation system security is a national and regional priority. The NCTCOG Transportation System Safety Program Area also supports ongoing local, state, and federal initiatives related to transportation system security and emergency preparedness planning in the North Central Texas region. NCTCOG dialogues continuously with local governments and transportation providers to regionally coordinate response plans, response capabilities and resources, and emergency medical services in the event of a major incident. The ITS infrastructure is an integral part of the Transportation System Security Program.

The *Texas Homeland Security Strategic Plan 2015-2020*, a high-level roadmap for all homeland security efforts across the state, was released by the Governor's office in September 2015. The intent of this plan is to provide for an overwhelming response capability for any catastrophic incident such as evacuation planning for floods.

4.2 PLANNED IMPROVEMENTS

4.2.1 Roadway

In the Dallas-Fort Worth region, three documents are used to guide transportation project development and construction for roadways:

- Unified Transportation Program – On December 4, 2015, the President of the United States signed into law the Fixing America's Surface Transportation Act. This act guaranteed funding for highways, highway safety, and public transportation nationwide. To comply with this act, each state is required to develop a long-range plan for the allocation of federal transportation funds. The Unified Transportation Program, prepared by TxDOT, is adopted by the Texas Transportation Commission for use as the TxDOT 10-Year Plan.
- Transportation Improvement Program (TIP) – The TIP is a staged, multiyear, multimodal program of transportation projects proposed for funding by federal, state, and local sources. The TIP identifies roadway and transit projects programmed for construction within the next four years. Within the Dallas-Fort Worth metropolitan area, the TIP is developed by NCTCOG in cooperation with local governments, TxDOT, and local transportation agencies. The TIP is developed in accordance with the metropolitan planning requirements set forth in the *Statewide and Metropolitan Planning Final Rule* (23 CFR Part 450, 49 CFR Part 613). These rules were published in the October 28, 1993 *Federal Register* as required by the Intermodal Surface Transportation Efficiency Act of

1991, which has since been reauthorized periodically, most recently as the Fixing America's Surface Transportation Act.

- State Transportation Improvement Program (STIP) – The STIP is the state four-year funding program for on-system facility projects that includes those located in metropolitan planning organization and rural TIP jurisdictions. Project listings in the STIP must be consistent in design concept and scope with those identified in the state and metropolitan long-range plans. In pollutant nonattainment areas (Houston, Dallas-Fort Worth, Beaumont, and El Paso), projects must conform to the State Implementation Plan.
- Metropolitan Transportation Plan (MTP) – The current MTP, Mobility 2045, is the defining vision for transportation systems and services in the Dallas-Fort Worth metropolitan area. This plan was approved in June 2018 by the Regional Transportation Council, serving as the Metropolitan Planning Organization for the area. The MTP guides the implementation of multimodal transportation improvements, policies, and programs in the region through the year 2045.

4.2.2 Truck Facilities

Current regional truck routes in the study area include IH 35, US 377, SL 288, FM 428 and FM 2164. IH 35 is listed as a long-term candidate for truck lane restrictions in Mobility 2045.

4.2.3 Railroads

Freight rail lines within the study area are privately owned facilities. There is no publicly available information on proposed rail line improvements within the study area.

4.2.4 Airports

No airports exist within the study area.

4.2.5 Transit

There are no planned transit corridor projects within the study area.

4.2.6 Amtrak and High-Speed Rail

There are no planned high-speed rail or Amtrak improvement projects within the study area.

4.2.7 Bicycle and Pedestrian

The Denton Greenbelt Corridor is appropriate to be considered for bicycle and pedestrian accommodations for transportation purposes. This corridor would provide key connections and linkages to the cities of Denton, Aubrey, and Celina, and would also link with the existing and planned Denton Greenbelt Trail that connects the city of Denton and Lake Ray Roberts. The Denton Greenbelt Corridor would also connect to several locally planned trails and bikeways in Denton and Collin counties. In addition to the existing Greenbelt Trail, the city of Denton is planning for a bikeway accommodation along FM 428 from the city center north to the intersection of FM 2153. The Denton Greenbelt Corridor also crosses several planned trails west of Celina along Mustang Creek and Little Elm Creek.

The Denton Greenbelt Corridor is appropriate to implement a Regional Veloweb trail. The Regional Veloweb, adopted as part of Mobility 2045, is a 1,883-mile network of existing, funded, and planned off-street shared-use paths (trails) designed for multi-use trip purposes by bicyclists, pedestrians, and other non-motorized forms of transportation. The Regional Veloweb serves as the regional expressway network for active transportation, and it extends the reach of the region's roadway and passenger rail transit network for non-motorized transportation. Regional Veloweb trails are expected to be consistent with the guidance set forth by the American Association of State Highway and Transportation Officials for the development of

bicycle facilities with minimum widths of 12 to 14 feet and with 16- to 24-foot wide sections or separated facilities for pedestrians and bicyclists in areas with high-peak user volumes. Typical trail bridges along the Regional Veloweb are a minimum of 16 feet (12-foot trail with 2-foot shy distance on each side of the trail). The Regional Veloweb is typically implemented within independent right-of-way corridors such as greenways or along highways and are grade separated when crossing roadways with significant traffic volumes.

In the Denton Greenbelt Corridor, a Regional Veloweb shared-use path would be appropriate within the highway right-of-way. The paths should include appropriate setbacks and buffers from the main lanes and/or frontage road lanes and include grade separation whenever crossing major roadways and intersections to avoid safety conflicts with motor vehicles.

4.2.8 Safety and Security

Currently, there are no specific safety and security projects identified within the study area. To guide future deployment and to build regional consensus for multi-agency systems integration, the region has developed a Regional ITS Architecture.

4.3 TRANSPORTATION SYSTEM PERFORMANCE

Table 4.2 shows the performance measures calculated for the study area roadway network. Level-of-service is a rating system for roadways based on operating conditions with A being best and F worst. It provides an estimate of the maximum amount of traffic that a facility can accommodate while still maintaining traffic operations. Level-of-service is an indicator used to measure operating conditions such as freedom to maneuver, speed, comfort, convenience, and safety. In 2045, approximately 9.2 percent of the existing roadway segments in the study area (as defined in Section 2.3) are projected to be at level-of-service D or E and 15.2 percent at level-of-service F.

The study area is shown in Figure 4-1. Study areas are composed of traffic survey zones used in the Dallas-Fort Worth Regional Travel Model for the Extended Area. Traffic survey zones in rural areas can be geographically large. This results in the inclusion of some roadways in the study are that are a distance from the proposed alignment areas. For example, the study area includes 55 freeway/toll road lane miles.

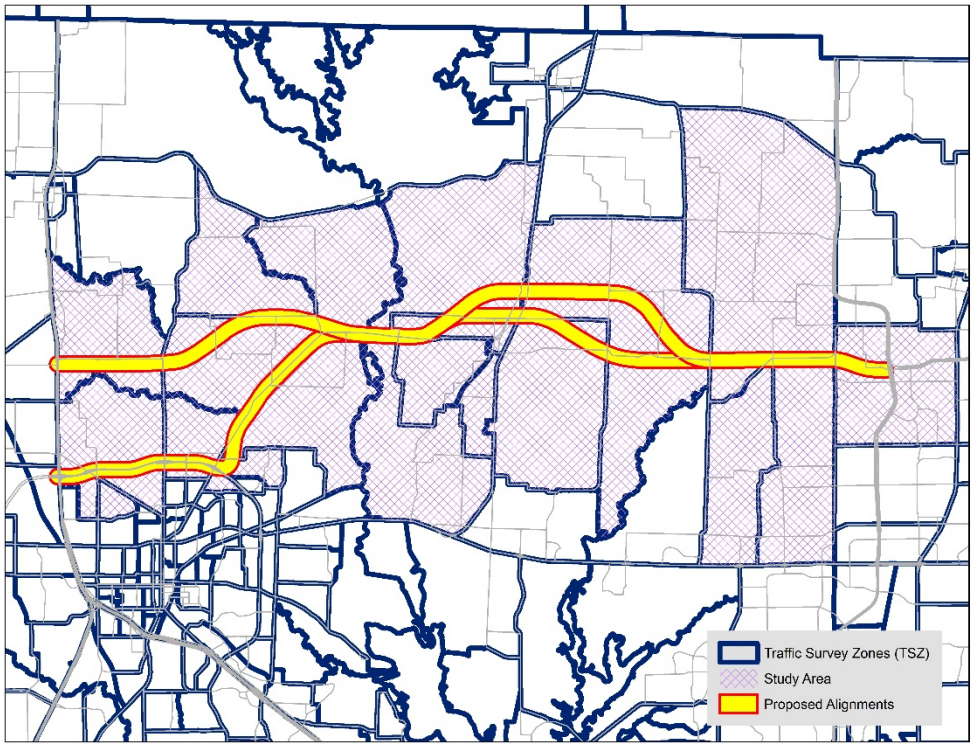
Table 4.2. Study Area Transportation Performance Measures

2045 Performance Measure	No Build
Vehicle Miles of Travel per Day	2,398,323
Vehicle Hours of Travel per Day	60,418
Vehicle Hours of Congestion Delay per Day	11,670
Average Speed (miles per hour)	39.7
Lane Miles in Study Area	
Freeway/Toll Road	55
Principal Arterial	74
Minor Arterial	218
Collectors	216
Freeway Ramps	16
Frontage Roads	51
HOV	0
Total Roadway Network	**630**

2045 Performance Measure	No Build
% Lane Miles at Level-of-Service D, E	
Freeway/Toll Road	25.4%
Principal Arterial	22.9%
Minor Arterial	3.2%
Collectors	8.3%
Freeway Ramps	3.9%
Frontage Roads	0.0%
HOV	0.0%
Total Roadway Network	**9.2%**
% Lane Miles at Level-of-Service F	
Freeway/Toll Road	0.0%
Principal Arterial	16.2%
Minor Arterial	26.1%
Collectors	11.5%
Freeway Ramps	6.2%
Frontage Roads	0.0%
HOV	0.0%
Total Roadway Network	**15.2%**

Source: NCTCOG, 2018

Figure 4-1. Denton Greenbelt Corridor Study Area



4.4 CAPACITY AND LEVEL-OF-SERVICE ANALYSIS

As noted in Section 4.1.1, the roadway network within the study area is consistent with the predominantly rural character of the area. Table 4.3 shows projected year 2045 roadway performance characteristics within the study area based on a No-Build condition for the Denton Greenbelt Corridor. There are projected to be over 630 lane-miles of roadways in the study area, carrying just under 2.4 million vehicle miles traveled on a daily basis. About 24.4 percent of these lane miles are anticipated to have a level-of-service of D or worse in 2045.

Table 4.3. Year 2045 Study Area Level-of-Service and Roadway Performance

Roadway Type	Lane Miles in Study Area	Percent of Lane Miles at D, E	Percent of Lane Miles at F	Daily Vehicle Miles Traveled	Average Loaded Speed (miles per hour)	Vehicle Hours of Congestion Delay
Freeway/Toll Road	55	25.4%	0.0%	414,917	63.3	824
Principal Arterial	74	22.9%	16.2%	528,473	42.2	2,812
Minor Arterial	218	3.2%	26.1%	984,052	38.0	5,796
Collectors	216	8.3%	11.5%	244,811	25.9	1,918
Freeway Ramps	16	3.9%	6.2%	99,853	37.2	224
Frontage Roads	51	0.0%	0.0%	126,217	38.2	96
HOV/Managed	0	0.0%	0.0%	0	0.0	0
Roadway Network	**630**	**9.2%**	**15.2%**	**2,398,323**	**39.7**	**11,670**

Source: NCTCOG, 2018

Freeways and tollways account for 8.7 percent of the total lane miles, but carry 17.3 percent of the vehicle miles traveled within the study area. Over one quarter of the freeway and tollway lane miles in the study area are projected to have level-of-service D travel conditions or worse. Principal arterials in the study area are expected to be the most congested type of facility, with almost 40 percent of lane miles performing at level-of-service D, E, or F. They account for 11.7 percent of the total lane miles and carry 22 percent of the vehicle miles traveled within the study area. Minor arterials account for 34.6 percent of the total lane miles and carry 41 percent of the vehicle miles traveled within the study area. Approximately 29.3 percent of the minor arterial lane miles in the study area are projected to have level-of-service D or worse, making it the second most congested type of facility. The remaining vehicle miles traveled are carried by collectors (10.2 percent) and other roadway types (9.4 percent). Over 80 percent of the lane miles for these types of facilities are projected to operate at level-of-service A, B, or C.

5.0 INDIRECT AND CUMULATIVE IMPACTS

This chapter discusses the potential indirect and cumulative impacts associated with the proposed project.

5.1 INDUCED GROWTH IMPACT ANALYSIS PROCESS

The majority of indirect impacts occurs from induced growth. The growth that occurs from the proposed roadway is either absolute (would only develop if the proposed project is built) or temporal (would develop quicker if the proposed project is built).

Impacts associated with induced growth can occur to any resource identified in this document. The process used to determine induced growth impacts methodology is a combination of two studies and reports related to indirect impacts and induced growth: National Cooperative Highway Research Program (NCHRP) Report 466 and the American Association of State Highway and Transportation Officials (AASHTO) Handbook 12.

Before an induced growth impact analysis is completed for any project, it is first determined if such an analysis is appropriate and needed for the project. Specific actions trigger a need for an induced growth impact analysis. If a proposed project does not include these criteria, then it is resolved that no induced growth would incur from the project and no further induced growth impact analysis is required. The proposed project is examined through a qualitative process to determine if further study is required. The following criteria are used to ascertain if further study is needed (only one condition is required):

- The need and intent includes economic development
- Economic development or new opportunities for growth and development is cited as a benefit of the project
- The project is adding capacity in a metropolitan planning organization (MPO) boundary that has available land for development and is experiencing population and/or economic growth while increasing mobility in the area

The proposed project would satisfy all three conditions. Development is listed as part of the intent of the project and is cited as a benefit. Additionally, the project falls within the MPO boundary, adds capacity, and is located in a rural area with development opportunities and is experiencing high growth. Therefore, an induced growth impact analysis will be completed for this project.

5.1.1 Methodology

Both the NCHRP report and the AASHTO handbook recommend various methodologies that can be used for an induced growth impact analysis. Usually, these analyses are completed in the National Environmental Policy Act process where information and details are more precise and allow greater flexibility in choices of methodology. Because of the scope of this project, most options for an induced growth analysis would not be feasible. Two methods were identified that would fulfill the scope of the project and would be feasible with the available data:

- Four-Step Model – this is a travel demand model used by MPOs for traffic modeling. Since the North Central Texas Council of Governments (NCTCOG) is an MPO, this model and its results are readily available for this study and fit the larger scale feasibility study documents. The Dallas-Fort Worth Regional Travel Model for the Extended Area, known as DFX, is the traffic model used by NCTCOG for this method.
- Planning Judgement – this method uses professional studies and professionals as a method to procure future growth information in the project study area. NCTCOG has met

with the cities and county as part of the planning process and will use their future growth plans to supplement the traffic model data.

Using these two methods together will provide a broad view of the anticipated induced growth within the project study area.

5.1.2 Area of Influence

The Area of Influence (AOI) should be defined as appropriate for the project. The main methodology for the induced growth impact analysis uses the travel demand model for traffic and traffic patterns. The area should be large enough to account for all major changes to the roadway network that would be affected by the project while excluding those areas that would not be strongly affected. For this analysis, it was determined the project should include data from all the DFX Traffic Survey Zones (TSZ) that the project traversed and any TSZs that would also be affected (i.e. if the project was next to a TSZ boundary or the TSZs were small).

The proposed project occurs in a rural area in Denton County; TSZs in this area remain large to account for the lower population and infrastructure. A 1.5-mile buffer from the project would account for any potential TSZs that could be affected by the proposed project. The temporal setting for this analysis includes all data up to Mobility 2045; all traffic data from Mobility 2045 has a maximum temporal setting of 2045.

5.1.3 Areas of Induced Growth

As stated in previous chapters, Denton County is experiencing increased growth above local, state, and national average rates. This general high growth is expected to occur in the project AOI.

Direct areas of induced growth could not be identified because this project is currently in the feasibility phase and specific project details are not available, but a general evaluation for identifying areas of induced growth was used for this project. The DFX shows growth in all TSZs within the AOI, and vehicle miles traveled (VMT) increased as a result of the project:

- 2018: 881,557
- 2045 No-Build: 2,463,182
- 2045 Build Average: 3,707,592 (Alignment 1) and 3,460,648 (Alignment 2)

Building the Denton Greenbelt Corridor would cause an increase in VMT in the AOI by 51 percent (Alignment 1) and 40 percent (Alignment 2) over the No-Build option.

The Denton County Thoroughfare Plan highlights expansive growth throughout the AOI, but no specific locations for induced growth were identified within the document. Conversations with the county and the associated cities identified three major areas of induced growth: within the city of Denton near IH 35 at the western terminus of the project, in Aubrey at US 377, and at the eastern terminus at the Dallas North Tollway (DNT) extension.

The data shows for this study that the entire AOI would experience induced growth from the DFX, and the areas at IH 35, at US 377, and at DNT would experience the greatest induced growth based on data gathered by the cities and county.

5.1.4 Resources Impacted from Induced Growth

Because the direct knowledge of induced growth locations could not be identified during this phase of the study, the general AOI and the areas specified will be used to determine induced growth impacts.

The majority of land use types that could be impacted from induced growth in the AOI include ranch land (41 percent), residential acreage (26 percent, farmland (12%), and single family (8 percent). The remaining 22 different land use types account for less than 3 percent individually.

The intense land use around IH 35, US 377, and the future DNT had similar results. Table 5.1 illustrates the land use percentages within 1.5 miles of the proposed intersections with these roadways and the Denton Greenbelt Corridor.

Table 5-1
Land Uses at Major Intersections

Major Intersection	Alternative 1	Alternative 2
IH 35	Ranch Land: 56% Residential Acreage: 17% Single Family: 8% Commercial: 4%	Ranch Land: 50% Residential Acreage: 22% Farmland: 8% Single Family: 7%
US 377	Ranch Land: 46% Residential Acreage: 41% Single Family: 4% Commercial: 2%	Residential Acreage: 40% Ranch Land: 38% Single Family: 8% Commercial: 3%
Future DNT	Farmland: 79% Residential Acreage: 8% Vacant: 4% Single Family: 3%	

The predominant potential land use impacts were associated with ranch land, farmland, and residential acreage, all of which are open-land type uses with few structures and development. Both Alternative 1 and Alternative 2 contained similar impacts to resources.

For both the general AOI impacts and the identified intense impacts, agricultural land (ranch land/farmland), open space (residential acreage), and wildlife are identified to have indirect impacts.

5.1.5 Mitigation

Mitigation for indirect impacts is usually considered if these identified impacts conflict with the study area goals, worsen the condition of sensitive or vulnerable resources, could delay or interfere with planning improvement of the impacted resource, or are inconsistent with any applicable law. While it is unlikely potential indirect impacts identified for the Denton Greenbelt Corridor may trigger any of the listed causes that would require consideration for mitigation, such a condition won't be fully ascertained until a more thorough evaluation is performed concurrent with the Environmental Assessment or Environmental Impact Statement process. Though no mitigation is recommended for potential indirect impacts caused by the Denton Greenbelt Corridor at this stage of development, such actions will ultimately be determined based on resource agency and stakeholder engagement as the project advances closer to the delivery phase.

5.2 CUMULATIVE IMPACTS PROCESS

The cumulative impact analysis is designed to identify the cumulative effect multiple actions could have on resources. This process takes direct impacts of the proposed project, as well as the indirect impacts, and considers if those effects together could cause significant harm to the identified resource.

5.2.1 Methodology

To adhere to the spirit of Planning and Environmental Linkages, this analysis will use the Texas Department of Transportation's guidance on cumulative impacts. The guidance recommends a concise study unless significant environmental impacts are anticipated. Because this is a feasibility study and the current investigations have not determined significant impacts would occur, a short, concise, and mostly qualitative analysis will be conducted.

Resources that should be studied in a cumulative impact analysis should have been identified in both the direct and indirect sections of the document as receiving impacts by the proposed project. Additionally, any resource that is identified as a resource of concern should be included. Resources of concern are those that are protected by legislation or resource management plans, ecologically important, culturally important, economically important, or important to the well-being of a human community.

Each resource identified will be analyzed to determine if cumulative impacts would occur and to determine if any mitigation is required.

5.2.2 Identified Resources, Study Area, Condition, and Trends

The indirect impacts analysis identified three resources that may have indirect impacts: ranch land/farmland, open land, and wildlife. The Greenbelt that crosses the project at FM 428 is identified as ecologically important and protected and will be included in the discussion of open land.

All these resources are biological in nature; therefore, the study area is identified as the Texas Blacklands Prairie. The Texas Blacklands Prairie is a temperate grassland that runs from the Red River north of Dallas-Fort Worth and extends south to San Antonio covering over 19,000 square miles. The Texas Blacklands Prairie is currently in decline, with prairie land being converted to farmland and ranch land and, eventually, urbanization. This trend is expected to continue as farmland and ranch land is repurposed to suburban areas and new farmland and ranch land is used to compensate for the suburban loss.

5.2.3 Direct and Indirect Impacts on Resources

The direct impacts of the proposed project are listed in Chapter 3. These impacts would include the construction of a roadway facility and permanent conversion of land to transportation use. Indirect impacts are described in Chapter 5.1 and outline expected growth near the proposed roadway that would convert mostly farmland, ranch land, and residential acreage to commercial and residential use.

5.2.4 Other Reasonably Foreseeable Actions

All reasonably foreseeable actions in the project area and AOI would include those transportation projects outlined in Mobility 2045 and the growth indicated in the comprehensive plans for the cities and county. These plans include improvements to IH 35, US 377, the new extension of DNT, and FM 455. Each comprehensive plan as detailed in the previous chapters show extensive growth in the project area and the AOI.

5.2.5 Cumulative Effects of the Proposed Project and Other Actions

The proposed project would directly convert land to transportation use, and indirect impacts and growth would continue to convert land to urban use and more farmland and ranch land. While the Texas Blacklands Prairie is in decline in general, much of this area has already experienced conversion of grassland to farmland, ranch land, and residential acreage. The current land uses are expected to become more urbanized. These losses of rural land uses are not expected to impact the collective health of these types of land uses since they are abundant across areas

associated with the Texas Blacklands Prairie. However, these effects will be evaluated with greater precision as the project proceeds toward advanced development stages.

Wildlife would experience a local decline as the area becomes more urbanized. While numerous areas for wildlife and open areas may remain, overall health characteristics will be highly dependent on the temporal and geographical components on subsequent cumulative effects analyses. The Greenbelt that crosses the proposed project is a sensitive resource, and such an open area is important to wildlife habitat. As detailed in this study, some recommendations to minimize impacts to this sensitive area have been identified. It is not anticipated further impacts would occur in the AOI or surrounding areas to the Greenbelt because of legal protection that prevents any development within the Greenbelt. However, as specific design, engineering, and comprehensive planning parameters surrounding the project become further resolved, more intensive analyses of cumulative effects will need to occur.

5.2.6 Mitigation

No mitigation for cumulative impacts is proposed at this time because no significant cumulative impacts are expected to occur as a result of the proposed project itself. Any projects that would occur in the project area, AOI, and the Texas Blacklands Prairie would follow all federal, state, and local laws, including potential mitigation. The highly sensitive area of the Greenbelt is protected by legal regulations and would remain a valuable undisturbed area for wildlife. It is important to note, however, that cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR §1508.7). As such, it may be difficult to understand the role that a proposed action may have in contributing to the overall or cumulative impacts to an area or resource. Therefore, with respect to such sensitivity, it is likely such an evaluation may yield alternative measures as the project moves closer to actual implementation.

6.0 STAKEHOLDER INVOLVEMENT

The Denton Greenbelt Corridor Feasibility Study was developed through a proactive stakeholder involvement process. All meetings and presentations were conducted to gain knowledge and input from local governments, resource agencies, and private stakeholders throughout the study effort. This chapter summarizes the agency coordination and stakeholder involvement efforts.

6.1 RESOURCE AGENCY COORDINATION

The North Central Texas Council of Governments (NCTCOG) engaged resource agencies through one coordination meeting. The purpose of these meetings was to inform resource agencies of study efforts, obtain input, and discuss collaborative strategies for continued interaction throughout the project development and evaluation process. As shown in Table 6.1, representatives from two resource agencies attended the meetings. Each of the meetings is summarized below. Detailed minutes are included in the Appendices.

August 2, 2017, Regulatory Agency Stakeholder Meeting

Three agencies were represented at this meeting: US Army Corps of Engineers (USACE), Texas Parks and Wildlife Department (TPWD), and NCTCOG. There were 17 attendees. Discussion items included the project background, right-of-way for FM 428, restrictions created by the conservation easement, environmental review processes, and resource agencies' priorities for the corridor. TPWD expressed concern about wildlife crossings and the group discussed elevating the roadway as a potential mitigation measure. USACE and NCTCOG discussed the need to provide a conveyance for flood water. TPWD and USACE suggested relocating parking to fee land south of the facility, and USACE noted that the park access road may need to be rebuilt outside of the right-of-way; however, construction may not be allowed on fee land if it is a sensitive environmental area. TPWD identified potential impacts on viewshed, noise, vegetation, silt deposition, archaeological deposits, and the historic bridge. TPWD also proposed mitigation options for controlling invasive species.

Table 6.1. Resource Agency Coordination

Agency	Name
Texas Parks and Wildlife Department	Brandon Childers Brad Hood Rich Mahoney Chris True
US Army Corps of Engineers	Vicki Akers Art Archambeau Rob Jordan Craig Kislingbury Jennifer Linde Randy Merchant Brandon Mobley Marty Underwood Greg Webb

6.2 LOCAL GOVERNMENT AND STAKEHOLDER COORDINATION

Throughout the study, meetings were held to gain input from and coordinate with local governments, businesses, and other stakeholders. These meetings helped ensure that local community context, environmental constraints, and other factors were considered in the study. Nine stakeholder meetings were held between June 2017 and January 2019. Each of the meetings is summarized in this chapter, and meeting minutes are included in the Appendices. Table 6.2 lists the individuals who attended the stakeholder meetings.

INVEST (Infrastructure Voluntary Evaluation Sustainability Tool) criteria CS-06.1 through CS-06.5 address engaging relevant community stakeholders and environmental justice populations, using inclusive public involvement techniques, providing education about transportation planning, and promoting sustainability. These topics were addressed during stakeholder meetings and presentations. Public involvement techniques included a project website and visualizations. During the final stakeholder meeting, attendees were informed their comments would be included in the feasibility study, which leads to the National Environmental Policy Act process. INVEST criteria CS-07.3 sought the engagement of community "champions" for the project. Several of the Denton Greenbelt stakeholders initially sought the involvement of NCTCOG and played the role of champions during the project. INVEST criteria 12.3 called for engaging freight stakeholders if applicable. Minimal freight facilities or associated supply-chain facilities are located in the corridor, including a truck stop near the intersection of Alignment 2 and IH 35 and Union Pacific railroad tracks in Aubrey; external stakeholders were not engaged. A member of NCTCOG's freight team did participate in the transportation stakeholders meeting.

June 6, 2017, Denton Greenbelt Stakeholders Meeting

This meeting had 24 attendees representing a variety of governmental and private stakeholders. Discussion items included the project background, potential project impacts, conservation easement restrictions, opportunities for off-site mitigation, and the planning process. Stakeholders stressed the importance of maintaining safe, uninterrupted access to hiking and equestrian trails. Roadway and parking lot design should accommodate horse trailers. Attendees also discussed the need for a safe wildlife crossing; the undesirability of utility development in the corridor; and the need to mitigate noise and light pollution, aesthetic impacts, and water quality impacts. USACE called attention to the construction restrictions on its conservation easements bordering FM 428, which could conflict with plans to expand the roadway footprint. Stakeholders proposed exploring options for off-site mitigation and asked NCTCOG to research best practices for addressing the kinds of issues associated with this project.

October 5, 2017, Meeting with City of Denton

Six staff persons from the city of Denton and NCTCOG attended this meeting. The Denton Greenbelt Corridor was one of seven development and improvement projects discussed. City staff proposed an alternate alignment for the Denton Greenbelt Corridor that they believed would accommodate the city's future growth better than the original proposal to route the corridor along Milam Road to IH 35. The new proposed alignment connects Aubrey to Loop 288 and IH 35 by routing the corridor south along FM 428 (Sherman Drive).

December 5, 2017, Denton Greenbelt Stakeholders Meeting

In attendance at this meeting were 24 individuals representing various governmental and private stakeholders. Discussion items included background on the project and stakeholder outreach/coordination efforts, best practices research (case studies), facility alignment and design, and potential impacts and mitigation options. The attendees determined that the right-of-

way was not wide enough to install a vegetated buffer for noise mitigation. Wildlife movement through the greenbelt could be accommodated through bridge design. Stakeholders noted that the planned 10-foot shoulder was not wide enough to accommodate bicyclists, and NCTCOG suggested creating a bike route detour over the historic bridge. Meeting attendees also discussed potentially acquiring additional right-of-way and moving the historic bridge (if warranted, given projected future traffic conditions); studying alternative alignments; using land east or west of the conservation easement to build park access/egress ramps that are safe for horse trailers; constructing a pedestrian or bicycle path to Aubrey; preserving access to the trail between US 380 and FM 428; and mitigating congestion at the intersection with US 377. Many of these issues will need to be addressed through more detailed studies later in the planning process.

January 30, 2018, Meeting with City of Denton and Denton County

This meeting had eight attendees representing the city of Denton, Denton County, and NCTCOG. Discussion items included project alignment, design, and schedule. Denton County advocated for the original proposed alignment connecting Aubrey to IH 35 via Milam Road. That alignment is reflected in the county's 2017 thoroughfare plan. The city of Denton agreed to the county's proposal and NCTCOG staff discussed the possibility of also constructing a spur that would connect the Denton Greenbelt Corridor to Loop 288. The stakeholders agreed that the Denton Greenbelt Corridor should not extend further west than IH 35. The stakeholders also discussed limiting the number of lanes but having sufficient right-of-way to allow for conversion to controlled access. The county expressed its preference to prioritize the construction of other projects before the Denton Greenbelt Corridor, and NCTCOG noted that environmental review could still proceed at this early stage. The city commented that in the Greenbelt Corridor, there might be available right-of-way between the historic bridge and the northern edge of the conservation easement.

October 22, 2018, Transportation Partners Meeting

This meeting had 14 attendees representing Denton County Transportation Authority, the city of Denton, the town of Prosper, and NCTCOG. Discussion items included project alignment, design, and conservation easement restrictions. Meeting attendees advocated for transit and bicycle/pedestrian use of the corridor. They discussed various options for accommodating those modes and expected traffic volumes within the spatial constraints of the conservation easements. These included vertical stacking of facilities, tunneling under the easement, routing a Veloweb trail over the historic bridge, and moving the bridge out of the right-of-way. The city of Denton stated its preference for routing the facility along Milam Road to IH 35 instead of connecting with Loop 288.

January 8, 2019, Meeting with City of Aubrey and Land Owners

This meeting had four attendees representing the city of Aubrey or local land owners. Discussion items included potential designs of the Denton Greenbelt Corridor that would accommodate more than four lanes in the greenbelt crossing and would provide safe acceleration and deceleration opportunities for horse trailers. Meeting attendees discussed the possibility of relocating the historic bridge located in the current right-of-way. Also discussed was the city of Aubrey's expected population growth, which exceeds the NCTCOG projections used in the draft feasibility study.

January 22, 2019, Denton Greenbelt Stakeholders Meeting

This meeting had 17 attendees representing a variety of governmental and private stakeholders. Discussion items included recommendations and next steps included in the Draft Denton

Greenbelt Corridor Feasibility Study (December 2018). Stakeholders discussed their desire for frontage roads at the corridor's intersection with US 377 and the need for additional main lanes in the corridor west of US 377, including in the Denton Greenbelt. Attendees also discussed the condition of trails in the park and potential park improvements that could be mitigation for potential park impacts. Also discussed were expected population growth in the city of Aubrey and safety, ecological, and stormwater concerns in the corridor.

January 23, 2019, Denton Greenbelt Stakeholders Webinar

This meeting had four attendees representing a variety of governmental, transportation, and private stakeholders. Attendees discussed the need for horse trailer access to the park. Also discussed were the number of lanes included in the Draft Denton Greenbelt Corridor Feasibility Study (December 2018). Attendees discussed community support for additional main lanes that may require acquisition of federal lands or lands under conservation easement. Also discussed was the need for a wildlife and recreation overpass/underpass, and the need for an east-west transit corridor in Denton County, possibly in the Denton Greenbelt Corridor.

Table 6.2. Attendees of Local Stakeholder Meetings

Entity	Name
Allison Engineering	Sue Allison
City of Aubrey	Mark Kaiser
Aubrey Mayor & City Council	Janet Meyers Jeff Miller
City of Dallas	Ben A. Stephenson
City of Denton	Katherine Barnett Tracy Beck Pritam Deshmukh Todd Estes Noreen Housewright
Denton County	John Polster
Denton County Transportation Authority	Ann Boulden
Federal Highway Administration	Connie Hill Galloway
Greenbelt Alliance	Tim Beaty Ken Dickson Rick Martino Richard Rogers
Kimley-Horn	Frank Abbott Roy Wilshire
Lake Ray Roberts Equestrian Trails Association	Tracy Matern Linda Moore Carol Nichols

Entity	Name
Private citizens with no affiliations	Glenna Butler
Texas Parks & Wildlife Department	Chris True
The Spinistry	Kevin Lee
Town of Prosper	Pete Anaya
US Army Corps of Engineers	Rob Jordan Jennifer Linde Paul Nealy Aaron Shine Marty Underwood Nick Wilson
US Fish & Wildlife	Sid Puder
USAGE	Curtis Petersen
Upper Trinity Regional Water District	Blake Alldredge Jason Pierce
Venable Ranch	Joe Tydlaska Wes Tydlaska

6.3 BRIEFINGS AND PRESENTATIONS

Throughout the study of the Denton Greenbelt Corridor, briefings and presentations were made to interested groups and organizations. Presentations helped gain input and keep interested persons informed of the study. Table 6.3 lists the three briefings and presentations.

Table 6.3. Denton Greenbelt Corridor Briefings and Presentations

Date	Presentation or Briefing	Location	Type of Meeting
7/13/2017	Lake Ray Roberts Equestrian Trails Association Annual Meeting	Rancho de la Roca, Aubrey	Organization Meeting
10/7/2017	Aubrey Peanut Festival	Downtown Aubrey	Community Festival
4/18/2018	Krum Lions Club	First Baptist Church, Krum	Organization Meeting
2/9/2019	Lake Ray Roberts Equestrian Trails Association Annual Meeting	Rancho de la Roca, Aubrey	Organization Meeting

6.4 LIST OF MEETINGS

In total, 13 meetings, briefings, and presentations were held in association with the Denton Greenbelt Corridor Feasibility Study. Table 6.4 lists these meetings and locations in chronological order.

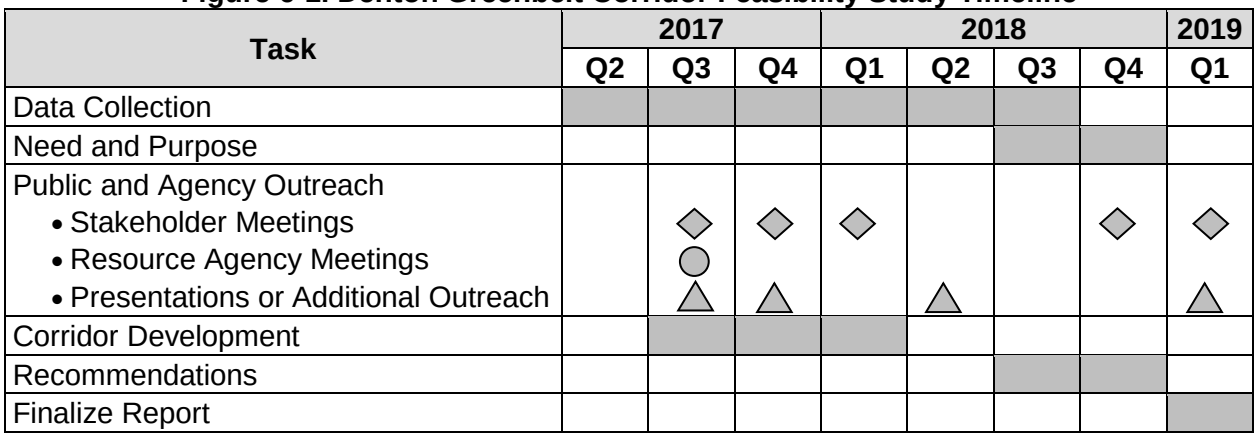
Table 6.4. Denton Greenbelt Corridor Meetings

Date	Presentation or Meeting	Location	Type of Meeting
6/6/2017	Denton Greenbelt Stakeholders Meeting	Rancho de la Roca, Aubrey	Local government and stakeholder meeting
8/2/2017	Denton County Outer Loop/Greenbelt Parkway Regulatory Agency Stakeholder Meeting	US Army Corps of Engineers Lewisville Lake Office	Resource agency coordination meeting
10/5/2017	Denton County Greenbelt Meeting with City of Denton	NCTCOG	Local government coordination meeting
12/5/2017	Denton Greenbelt Stakeholders Meeting	Rancho de la Roca, Aubrey	Local government and stakeholder meeting
1/30/2018	Denton County Outer Loop meeting with City of Denton and Denton County	NCTCOG	Local government coordination meeting
10/22/2018	Transportation Partners Meeting	NCTCOG	Transportation partner and local government meeting
1/8/2019	City of Aubrey Meeting	Aubrey City Hall	Local government and stakeholder meeting
1/22/2019	Denton Greenbelt Stakeholders Meeting	Rancho de la Roca, Aubrey	Local government and stakeholder meeting
1/23/2019	Denton Greenbelt Stakeholders Meeting	Webinar	Local government and stakeholder meeting

6.5 WEBSITE

Information specific to the Denton Greenbelt Corridor was added to the NCTCOG website (https://www.nctcog.org/trans/quality/environmental-coordination/planning-and-environmental-linkages). Information included a project overview and a local stakeholder meeting announcement. NCTCOG informed stakeholders about the webpage. Snapshots of the website are included in the Appendices.

Figure 6-1. Denton Greenbelt Corridor Feasibility Study Timeline



7.0 CORRIDOR DEVELOPMENT AND EVALUATION

7.1 CORRIDOR EVALUATION

Based on the results of the 2011 Regional Outer Loop Corridor Feasibility Study, the Denton Greenbelt Corridor between IH 35 and the Dallas North Tollway was recommended for future study. The Denton Greenbelt Corridor is currently identified as a "new or additional capacity freeway facility" in several long-range planning documents, including the North Central Texas region's Metropolitan Transportation Plan, the Dallas-Fort Worth House Bill 20 Regional 10-Year Plan (Fiscal Year 2017 to Fiscal Year 2028), and the Denton County Thoroughfare Plan. The Denton Greenbelt Corridor would serve as a logical terminus to the Collin County Outer Loop, which is recommended for future construction as a staged freeway from Dallas North Tollway to IH 30. Previous project goals were evaluated for consistency with regional transportation goals included in *Mobility 2045: The Metropolitan Transportation Plan for North Central Texas* (Mobility 2045)*;* Regional Transportation Council policies; the project needs defined in Chapter 2; and Federal Highway Administration's INVEST (Infrastructure Voluntary Evaluation Sustainability Tool) criteria (Appendix G) to identify sustainability-related content to include in corridor-scale studies. The following INVEST criteria were assessed in the corridor evaluation:

Multimodal Transportation and Health:

- CS 10.1 – Comparison of the alignments' opportunity to enhance the extent and connectivity of multimodal infrastructure, including bicycle and pedestrian connectivity.
- CS 10.4 – Identify how chosen alignments promote public health through improving congestion, safety, and opportunities for active transportation.

Transit Facilities: CS 11.1 – Identify the need, purpose, and appropriateness for transit access within the project footprint.

Optimizing Assets: CS 15.1 – Identify whether opportunities to maximize existing transportation system capacity (including bridges) are available before considering new major capacity.

Earthwork Balance: Identify the profile (preliminary engineering schematic) and terrain of alignments to incorporate grade into feasibility considerations.

Linking Planning and National Environmental Policy Act: CS19.1 – National Environmental Policy Act tiering; purpose and need statements; scoping and alternatives identification; analysis or baselining of environmental conditions; evaluation and/or elimination of alternatives; multimodal analysis, context sensitive design considerations; indirect and cumulative impacts assessment; and preparatory analyses for permitting.

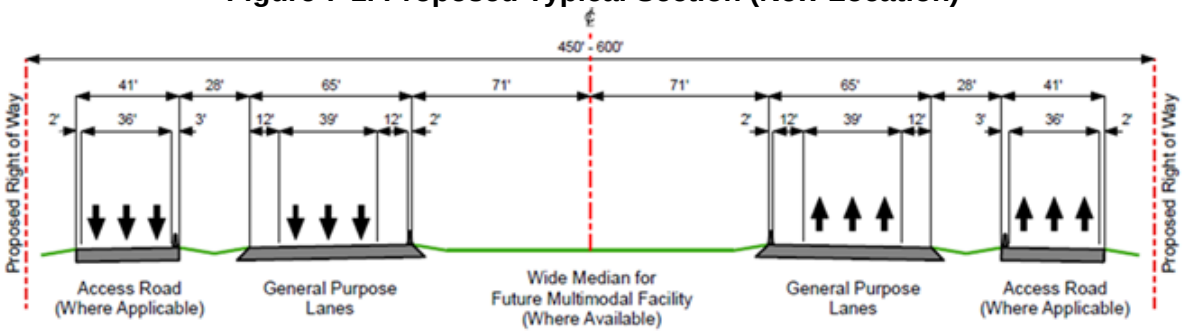
7.1.1 Corridor Width

In the context of the Regional Outer Loop Corridor Feasibility Study, a corridor alternative had a defined width of approximately one mile. This width was established based on planning judgment and experience. This width would not be the ultimate width of the facility; it merely helped to define the future corridor to be studied and allowed for flexibility in the future development of alignment options to avoid and minimize negative social, economic, and environmental effects.

7.1.2 Proposed Design Criteria

The typical right-of-way width assumed for the Regional Outer Loop was approximately 450 to 600 feet. This width was established based on roadway design standards for 85 miles per hour on new locations (e.g., Texas Department of Transportation 5R design standards). This width allows for a six-lane limited-access roadway with frontage roads (optional) while providing future flexibility and the opportunity to include multiple modes such as rail, utilities, truck lanes, bicycle, and pedestrian. Some corridors could follow along or near existing roadways and the design speed and typical section would vary depending on the availability of right-of-way along the existing facility. Figure 7-1 shows the typical section for a new location facility. Future preliminary engineering and environmental studies would be required to establish the type of facility and design standards required, specific alignment, number of lanes, and right-of-way needs.

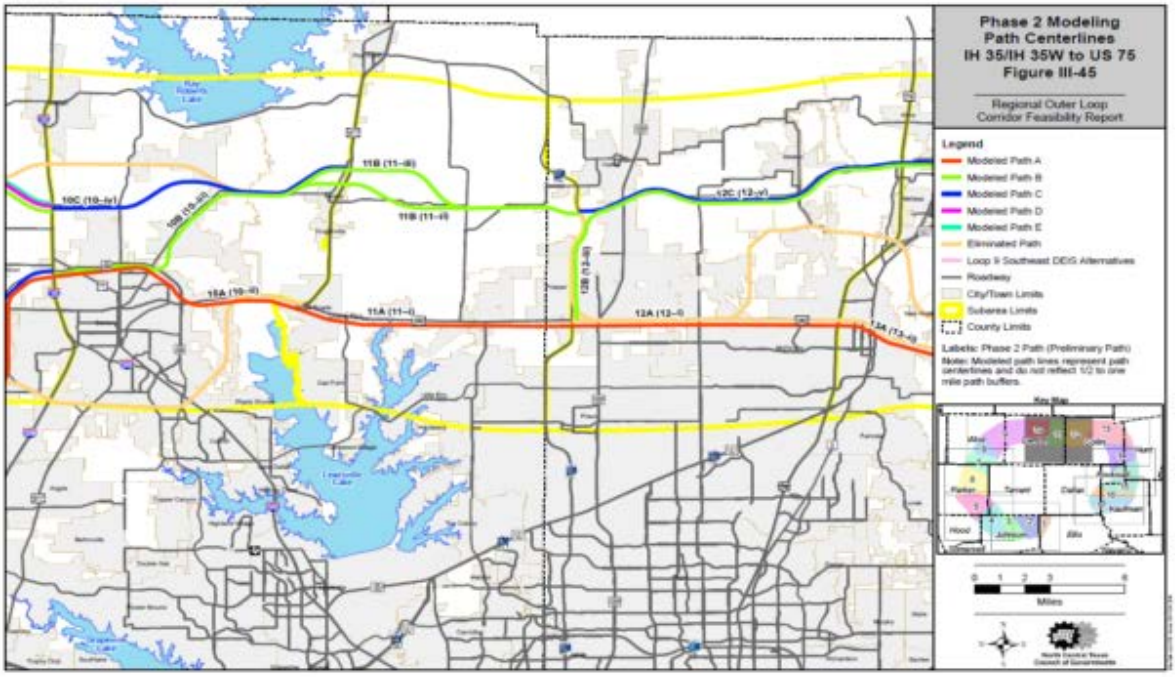
Figure 7-1. Proposed Typical Section (New Location)



7.1.3 Corridor Paths

Among the alignment options identified in northeastern Denton County, which included Subareas 10 and 11, the 2011 Feasibility Study specifically modeled Path B and C (Figure 7-2). Path B and C were determined to be feasible for further study.

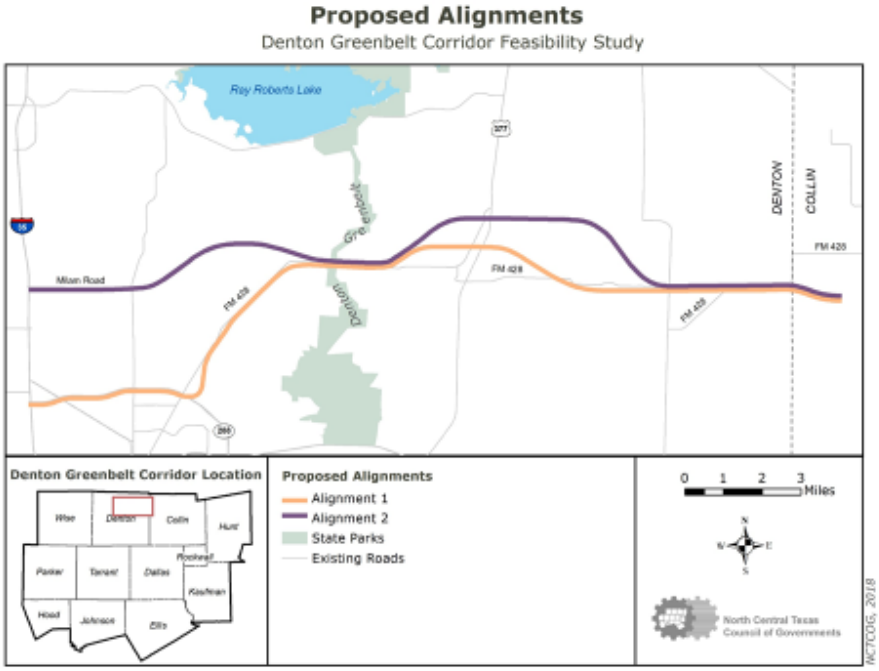
Figure 7-2. Corridor Paths for Future Study 2011



7.1.4 Proposed Alignments

Alignments 1 and 2 (Figure 7-3) are identified as the viable alignment options for the Denton Greenbelt Corridor. Both alignments will provide system connectivity (e.g., linkages to roadway, passenger rail, freight rail, airports), avoid and minimize negative impacts to the built and natural environments, and utilize existing roadway facilities to the greatest extent possible. During the study it was determined that neither the entirety of Alignment 1 nor Alignment 2 was preferred but instead a combination of both alignments. Alignment 2 west of the Denton Greenbelt was preferred while Alignment 1 east of the Denton Greenbelt was the preferred. Therefore, the locally preferred alternative would be a combination of both alignments.

Figure 7-3. Proposed Alignments 2018



7.1.5 Mode/Traffic Warrants

The predicted 2045 traffic volumes were compared to warrants based on the Transportation Research Board's *Highway Capacity Manual* (see Figure 7-4). To balance the financial planning requirements, level-of-service D is used for the volume warrants. The Denton Greenbelt Corridor is included in Mobility 2045 as a new or additional freeway capacity facility. According to an analysis performed for Mobility 2045, the Denton County Outer Loop (North) segment from IH 35 to the Dallas North Tollway (DNT) is projected to carry an average daily volume of 69,300. Mobility 2045 recommends an ultimate six-lane facility (three lanes in each direction) with six frontage road lanes (three in each direction). A proposed typical section is seen in Figure 7-5. Special design considerations will be required for the preservation of the Greenbelt Corridor and the historic Elm Fork Bridge across the Elm Fork Trinity River adjacent to existing FM 428 where right-of-way varies from 80 feet to 100 feet. The Denton Greenbelt Corridor is recommended to include four general purpose lanes plus occasional auxiliary lanes between IH 35 and US 377, and six general purpose lanes plus occasional auxiliary lanes between US 377 and DNT (just east of the Denton/Collin County line). The corridor is also proposed to accommodate four frontage road lanes (two lanes in each direction) plus occasional auxiliary lanes throughout its entire length except for two sections: the Greenbelt (Elm Fork Trinity River) crossing and the US 377/Union Pacific Railroad crossing.

Figure 7-4. Capacity Warrants

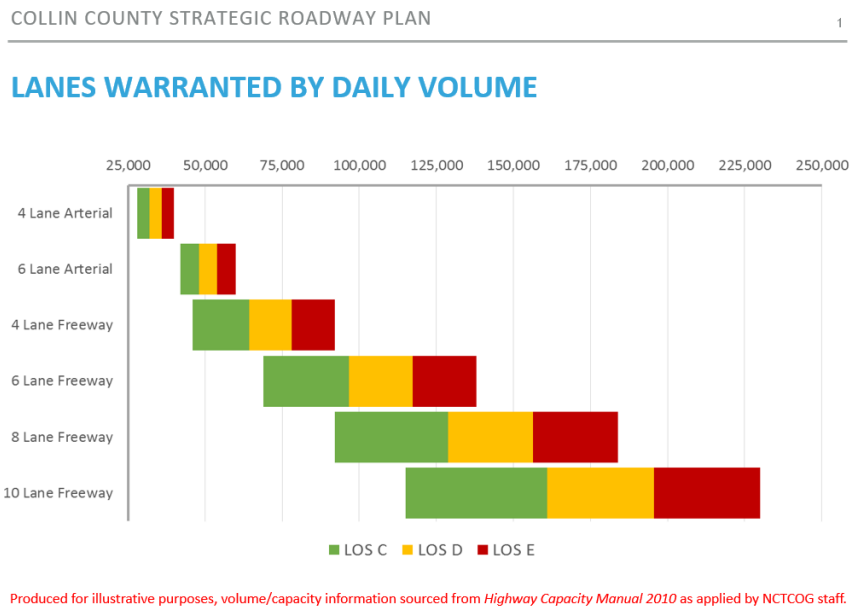
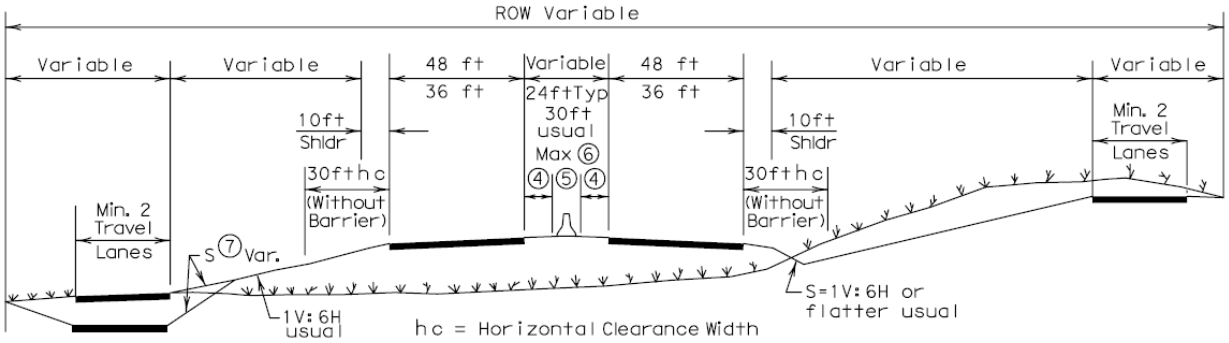


Figure 7-5. Proposed Typical Section



TYPICAL URBAN FREEWAY SECTION

① For minimum, 30 ft clearance to obstruction in medians. Width center line to center line of 84 ft + W is required. W = width of obstruction.

② Backslope in cuts may be exceeded in rock.

③ Additional width required in interchange areas.

④ 10 ft minimum on six lanes.

⑤ Median barrier generally used only in medians of 30 ft or less.

⑥ A 48 ft median is appropriate where a future additional lane in each direction is planned.

⑦ See Table 2-10 and Table 2-14 and discussion in section cross sectional elements, slopes and ditches, for slope rates.

7.1.6 Costs

Costs were not developed during the study because of the extreme speculative nature of the paths and corridors being evaluated.

7.2 RECOMMENDATIONS

Proposed recommendations for the Denton Greenbelt Corridor were presented to the study area stakeholders, the Federal Highway Administration, and resource agencies in November 2018 for review and feedback (see Appendix F for specific comments).

The City of Denton Thoroughfare Plan places the facility in conjunction with the planned Collin County Outer Loop. The conversion of the existing US 380 corridor to a controlled access freeway facility is not recommended because of potential social and economic impacts.

The Collin County Outer Loop between DNT and US 75 is currently within the design and environmental approval phase. A fully directional interchange between DNT and the Locally Preferred Alternative for the Collin County Outer Loop was approved in November 2008 by the North Texas Tollway Authority as part of the final schematic for the DNT Phase 4A Extension.

The Denton Greenbelt Corridor is recommended to include four general purpose lanes plus occasional auxiliary lanes between IH 35 and US 377, and six general purpose lanes plus occasional auxiliary lanes between US 377 and DNT (just east of the Denton/Collin County line). The corridor is also proposed to include four frontage road lanes plus occasional auxiliary lanes throughout its entire length except for two sections: the Greenbelt (Elm Fork Trinity River) crossing and the US 377/Union Pacific Railroad crossing. Continuous frontage roads through the Greenbelt crossing were determined not to be practicable because they could not be accommodated, along with the proposed general purpose lanes, within the current conservation easement width provided for the existing FM 428 roadway crossing and the adjacent historic Elm Fork Bridge.

8.0 NEXT STEPS

The purpose of the Denton Greenbelt Corridor Feasibility Study was to evaluate the need and feasibility for continuation of the Collin County Outer Loop and identify environmental constraints. Based on the evaluations conducted and 2045 traffic projections, a four-lane controlled access facility is warranted from IH 35 to US 377, and a six-lane controlled access facility is warranted from US 377 to the Dallas North Tollway. All data was reviewed and updated based on the latest available information and input from the public and resource agencies. These alternatives were evaluated according with local and regional transportation plans for transit, bicycle, pedestrian, and equestrian facilities. In order to fulfill federal and state funding, the project would need to follow Federal Highway Administration and Texas Department of Transportation project development guidelines and all applicable environmental regulations such as the National Environmental Policy Act (NEPA).

Add capacity to existing roadway or develop a new location: Loop 288/FM 428 or new rural arterial from IH 35 to FM 428 at FM 2153

Add capacity to an existing roadway and develop a new location roadway: FM 428 and new location Aubrey bypass from FM 428 at FM 2153 to the Dallas North Tollway

The North Central Texas Council of Governments used the Federal Highway Administration's INVEST (Infrastructure Voluntary Evaluation Sustainability Tool) to identify sustainability-related content to include in corridor-scale studies. INVEST criteria CS-07.1 is used for identifying alignments where context sensitive solutions should be addressed in NEPA. The North Central Texas Council of Governments (NCTCOG) addressed these issues throughout this chapter as a part of the feasibility process.

8.1 FUNDING

One of the major issues that will face this project is funding. Future funding for a section of the project has been identified in the 10-Year Plan of Projects for the Dallas-Fort Worth region, but additional funding will be required for the remainder of the proposed project. Future funding could involve innovative financing. This may include federal, state, or local funds. This will be determined during the NEPA process.

8.2 RIGHT-OF-WAY PRESERVATION AND ACQUISITION

In many cases, local governments gain dedications or donations of land to help preserve a corridor for a future transportation facility. Such dedications/donations can usually help minimize impacts and reduce project costs but are generally made contingent on the alignment meeting certain dictates of the donor such as adjacent property access. While this is a typical approach taken on local projects, land dedications/donations or early acquisition of land can be problematic if federal and/or state money is needed to fund the project. For example, further study may reveal that the dedicated land may be home to a protected species or is an important archeological or historical site; for these and other reasons, federal or state projects may not be bound to a particular alignment, in advance of an environmental study, strictly on the basis of donations.

If federal money could be used to implement a project, the NEPA process must be followed. For a controlled access facility on new location, NEPA typically requires the preparation of an environmental impact statement (EIS). For an EIS, the Federal Highway Administration requires the evaluation of more than one Build alternative even though the local government may have identified and or purchased right-of-way for a preferred alternative. Specifically, the Federal

Highway Administration Technical Advisory T6640.8A requires that for land, which has been reserved or dedicated by individuals or acquired by local governments for use as highway right-of-way, the draft EIS should identify the status and extent of such property and the alternatives involved. Additionally, the EIS should state that the reserved lands will not influence the alternative to be selected.

8.3 FUTURE ENGINEERING AND ENVIRONMENTAL STUDIES

As part of each corridor study, a specific need and intent for the corridor will need to be established. Chapter 2 of this document could be used to help provide a general basis but the transportation issues in each individual corridor need to be established. Within the recommended corridors, further development and evaluation of the typical section and alignment alternatives should be conducted. These alternatives need to be coordinated with local and regional transportation plans for transit, bicycle, pedestrian, and equestrian facilities. The alternatives, as well as a No-Build alternative, must be developed to an adequate level of detail to allow for evaluation of the direct, indirect, and cumulative on effects social, economic, and natural environments; travel demand; and costs. This step would also allow for the development of specific mitigation strategies to negate potential negative effects.

Both alignments may require a site-specific ecological assessment during the NEPA process. This need exists because the alignments cross a state park and conserved area that serve as a wildlife corridor between two reservoirs.

8.3.1 Engineering and Design

The corridors selected for further study would move into schematic and preliminary design in conjunction with a NEPA analysis. During this engineering phase, 10 to 15 percent of engineering plans typically would be developed. These plans would utilize traffic and movement analysis to determine lane widths, access points, cross roads designs, and specific horizontal and vertical alignments. These details would be further refined in the plans, specifications, and estimates for final design. However, the Texas Parks and Wildlife Department (TPWD) is requesting a more finalized design before signing off on 4(f) for the Denton Greenbelt Corridor.

While the Denton Greenbelt Corridor Feasibility Study recommends four general purpose lanes between IH 35 and US 377 because of special design considerations, design and engineering solutions should be sought to allow for six general purpose lanes, including at the Denton Greenbelt crossing, to accommodate locally expected population growth. Design and engineering solutions should be sought to provide safe acceleration and deceleration of freight vehicles as a proxy for horse trailers at the entrance and exit of the Ray Roberts Lake State Park trailhead at FM 428.

While the Denton Greenbelt Corridor Feasibility Study recommends no frontage roads at the Union Pacific railroad crossing at US 377 because of safety concerns and Union Pacific policy restrictions against at-grade crossings, design and engineering solutions should be sought to allow for frontage roads to be safely included at this location, such as including grade-separated crossings. Additionally, a connection from the Denton Greenbelt Corridor to US 377 should be provided to allow access to the city of Aubrey.

Future studies should consider the alignment identified in the Denton County Thoroughfare Plan (2017) and the Aubrey, Texas Master Thoroughfare Plan (2015).

NCTCOG used the Federal Highway Administration's INVEST to identify sustainability-related content to include in corridor-scale studies. INVEST criteria CS-18.1 calls for identifying a profile

of terrain and incorporating grades into the feasibility study. This will be addressed in the engineering phase referenced prior.

8.3.2 Future Public, Agency, and Tribal Nation Involvement

As the alignments recommended for further study move into the next phase of development, a comprehensive, open, and proactive public and agency participation plan should be developed for each project. These plans need to build upon the efforts of this study and other previous studies. Coordination efforts should begin at the start of each study. The plans must provide frequent and meaningful opportunities for resource agencies and the community to participate in the transportation planning process by reviewing and commenting on the process, alternative development, and analysis.

Implementing agencies of future phases of the Denton Greenbelt Corridor should include as stakeholders all tribal nations with interest in North Central Texas, including but not limited to the Thlopthlocco Tribal Town Tribal Historic Preservation Office, the Kiowa Tribe of Oklahoma, and the Muscogee (Creek) Nation Historic and Cultural Preservation Department.

The US Army Corps of Engineers and TPWD have been actively involved in the Denton Greenbelt Corridor Feasibility Study, as have community and nonprofit stakeholders. Future studies should continue to involve these stakeholders.

TPWD staff requested the 4(f) process not be conducted concurrently with the environmental process. Instead, TPWD staff requested a more finalized design before signing off on 4(f) for the Denton Greenbelt Corridor.

The Denton County Transportation Authority also has been an active stakeholder and should be consulted about its interest in establishing an east-west transit route in Denton County, potentially in the Denton Greenbelt Corridor.

8.3.3 Potential Minimization of Effects and Mitigation Strategies

To the extent possible, impacts should be avoided or minimized during the development of the specific alignments for the corridors. Prior to beginning environmental and engineering studies, it is recommended that the information and data included in this report be reviewed and updated based on the latest available information and input from the public and resource agencies. The information in this report could help establish baseline social, economic, and environmental conditions and help avoid important resources.

It is recommended that the subsequent environmental and engineering studies follow a context sensitive solutions (CSS) approach during the development of the specific alignments. CSS is an approach that considers the total context within which a transportation improvement project will exist. CSS is a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic, and environmental resources while maintaining safety and mobility. CSS should be considered throughout the entire project with emphasis on the Greenbelt crossing.

Avoidance and minimization of negative impacts will not be possible in all cases, so mitigation would be necessary. The following sections provide an overview of some potential minimization and mitigation strategies to be considered during the development of specific alignments. Mitigation measures, if required, would be included in the final environmental documentation for each project.

8.3.3.1 Land Use

A specific objective of *Mobility 2045: The Metropolitan Transportation Plan for North Central Texas* promotes sustainable development because of the direct link between land use, transportation, and air quality. Sustainable development strategies can preserve and even enhance valued natural and cultural resources and facilitate healthy, sustainable communities and neighborhoods. The development of transportation improvements need to be aware of the effects the existing and future transportation systems may have on land use development demand, choices, and patterns. Examples of sustainable development could include maximizing the use and operation of existing transportation facilities, limiting the location of access roads to maintain existing access only, encouraging development at interchanges rather than along the entire corridor, and ensuring sensitive land uses, such as schools, are not located along a major transportation facility.

It is recommended that potentially affected municipalities should include or discuss the recommended alignments in future updates to local planning documents. This would assist in the development of future zoning and land use plans. It would also help inform the community of the project and potentially minimize encroachments within the corridors.

8.3.3.2 Farmland

The alignments are located within rural areas. Future design efforts should attempt to avoid and minimize impacts to farmlands, including minimizing the division of existing farmlands and reduction of access to farmland. These design efforts could also consider maintaining and/or restoring access to affected properties. However, it is likely that in some instances, travel across a formerly undivided parcel may be hampered, or remainders may be uneconomical for farming or grazing purposes. Mitigation measures could include soil erosion control and invasive plant species control to reduce further impacts to adjacent farmland.

8.3.3.3 Community Effects

It is vital that designers ascertain the boundaries of existing and proposed community facilities (e.g., parks, recreational areas, schools) and neighborhoods. The design should strive to maintain local travel patterns and access to community resources. As mentioned in Section 8.3.3.1, it is recommended that affected municipalities include or discuss the recommended studies in future updates to local planning documents to help minimize encroachments within the corridors. The development of the preferred alignment must be conducted in an open, proactive manner.

The implementation of the project would require the acquisition of private property. Further engineering studies, along with public and agency involvement, would determine the location and amount of land to be acquired. Both the US and Texas Constitutions provide that no private land may be acquired for public purposes without adequate compensation. Because the project will involve federal and/or state funding, right-of-way acquisition and relocation assistance would be required to be purchased in accordance with the state and federal procedures.

8.3.3.4 Noise

During the development of future environmental documentation, a noise analysis needs to be conducted. Noise abatement measures should be considered for all impacted receivers. In much of the corridor, the land use activity areas adjacent to the corridors may be undeveloped and/or no new development may be planned, designed, or programmed in these areas at the time of the noise analysis. To avoid noise impacts that could result from future development of properties adjacent to a project, noise contours could be developed. These contours should be provided to the local officials responsible for land use control programs to help ensure, to the

maximum extent possible, no new residential or noise sensitive land uses (e.g., schools, parks) are planned or constructed along or within the predicted residential impact contours.

8.3.3.5 Cultural Resources

The preferred alignment could directly and/or indirectly adversely affect historic resources listed and/or recommended for inclusion in the National Register of Historic Places. To the extent possible, impacts must be avoided through project design. Mitigation for unavoidable impacts should be based on coordination with the Texas State Historic Preservation Officer and other interested parties. Mitigation of adverse impacts to historic resource is sometimes implemented through a program of detailed data retrieval or a detailed data recovery. Other mitigation options could include, but are not limited to, compatible design of project elements, vegetative screening, and relocation of the resource. For archeological sites, other mitigation options could include burial of the site context and detailed archival and historical research.

Pedestrian surveys and on-site field investigations should be performed as the main source for cultural resource identification and locations in lieu of relying on probability models to locate cultural resources. Any survey reports shall be provided for review to tribal nations with an interest in North Central Texas, including but not limited to the Thlopthlocco Tribal Town Tribal Historic Preservation Office, the Kiowa Tribe of Oklahoma, and the Muscogee (Creek) Nation Historic and Cultural Preservation Department. Any encounters with undiscovered properties shall be immediately reported to these tribal nations.

8.3.3.6 Parklands and Recreational Areas

The development of specific alignments that would avoid or minimize impacts to parklands and recreational resources must be developed. Any recreational or open space that may be affected by adjacency or indirect impacts associated with the potential alignments should be planned and designed to avoid or minimize those impacts. For unavoidable impacts, mitigation plans would be required and coordinated with officials that have jurisdiction over the resource.

Additionally, any trails in the corridor should be designed to accommodate their specific user/s, be they bicyclists, pedestrians, or equestrians.

NCTCOG used the Federal Highway Administration's INVEST to identify sustainability-related content to include in corridor-scale studies. INVEST criteria CS-12.4 addresses freight accessibility and mobility. The high use of equestrian recreation on the Greenbelt Trail may necessitate a classification of the park traffic as freight, which would result in the construction of acceleration and deceleration lanes for entrance to the Greenbelt Trail Park, allowing for vehicular safety with trucks towing horse trailers.

Stakeholders have identified priority mitigation strategies in Ray Roberts Lake State Park, which is operated by TPWD. A complete list of proposed stakeholder mitigation strategies is included in Appendix F. The stakeholders' top three priorities are summarized below:

1. Doubling or tripling the size of the Ray Roberts Lake State Park parking lot at FM 428 and improving parking lot and trailhead amenities. This would accommodate increased park usage brought on by the road expansion and population growth.
2. Repair and enhancement of trails between FM 428 and US 380 on the Denton Greenbelt. This includes an upgrade to all-weather trails, erosion controls, and bank stabilization along the trails and at the FM 428 bridge site, and reopening the trailhead on US 380, which is the closest access point to the city of Denton.

3. Construction of noise buffers using planting and cultivation of trees strategically placed to dampen noise at the FM 428 entrance to the park. This will mitigate increased traffic noise from the roadway expansion. Trees should be planted on a timeline to provide noise mitigation in time for the completion of the roadway expansion in the Denton Greenbelt.

8.3.3.7 Visual Quality and Aesthetics

As part of the recommended CSS approach, the final design could include landscaping treatments and aesthetic elements to help integrate the roadway with adjacent communities. The implementation of some aesthetic elements would likely require cost sharing by local governments to fund the improvements.

8.3.3.8 Utilities

It is advisable that the proposed typical sections in the alignments allow for future flexibility and the inclusion of utilities. Any proposed roadway improvements would likely affect existing utilities such as water, sewer, gas, telephone, and electrical lines; wells; and pipelines. Mitigation for relocation and accommodation of utilities should follow state and federal procedures. Because of growth expected in the cities of Aubrey, Denton, and Celina and the Denton Greenbelt Corridor's proximity to IH 35, an Energy Corridor, future planning should consider the need for infrastructure to support electric vehicle technology and to support automated vehicle technology.

Texas Department of Transportation allows utilities within its right-of-way. To reduce visual impacts to the park, below-ground utilities should be considered.

8.3.3.9 Economic

Prior to the development of an alignment, designers should ascertain the location of existing and proposed major employers, commercial properties, and activity centers. The design needs to strive to maintain local travel patterns and access to economic resources. As mentioned in Section 8.3.2.1, it is recommended that affected municipalities include or discuss the recommended corridors in future updates to local planning documents. This could help minimize encroachments within the corridors. The development of the specific alignments in each corridor should be conducted in an open, proactive manner.

8.3.3.10 Air Quality

All of the recommended projects for further study are within counties that are classified as nonattainment of the air quality standard for ozone. As mentioned in Section 3.4, transportation conformity is a requirement of the Clean Air Act Amendments that calls for the US Environmental Protection Agency; US Department of Transportation; and various regional, state, and local government agencies to integrate air quality and transportation planning development processes. All projects would be required to meet transportation conformity requirements.

8.3.3.11 Water Resources

All of the alignments studied would cross water bodies. Avoidance and minimization of impacts to water bodies (i.e., creek, streams, rivers, lakes) should occur during the development of alignments as discussed in Section 8.3.1. During construction, contractors would have to comply with the Texas Pollutant Discharge Elimination System general permit by incorporating best management practices through storm water pollution prevention plans. A variety of controls, both temporary and permanent, could be used to manage storm water runoff and control sediments (total suspended solids) from polluting streams. US Army Corps of Engineers

stakeholders have requested additional treatment of stormwater to remove oil and associated chemicals.

Despite avoidance and minimization efforts, projects could impact floodplains/floodways. Floodplain areas could be impacted by the placement of fill below the base floodplain elevation to raise the roadbed or structures (piers and abutments for bridge structures, etc.) within the floodplain. The type and extent of impacts to the floodplains and appropriate mitigation measures would be determined during final design when a detailed hydraulic analysis would be performed. Bridging floodplains/floodways, where feasible, would decrease impacts. Additionally, coordination with the Federal Emergency Management Administration and local floodplain administrators for affected communities would be required. This coordination would occur after finalization/selection of an alignment and the actual effects can be determined to ensure that no flood issues are created and appropriate mitigation measures are proposed.

Although appropriate and practicable avoidance and minimization efforts should be employed, waters of the US would likely still be impacted. Bridging wetland/waters of the US, where feasible, would substantially decrease impacts to these areas. Potential impacts of a preferred alignment could be further avoided and minimized during the detailed design phase. This could be accomplished through bridge design (i.e., placing columns in an environmentally sensitive manner, limiting the length of culverts, limiting placement of riprap, other design features).

8.3.3.12 Biological Resources

NCTCOG used the Federal Highway Administration's INVEST to identify sustainability-related content to include in corridor-scale studies. INVEST criteria CS-02.4 is used for identifying alignments that would require site-specific ecological assessments during the NEPA process and is addressed in this section.

It is recommended that avoidance and minimization of impacts to ecosystems and wildlife habitat occur during the development of specific alignments. Coordination with the appropriate agencies (i.e., TPWD, US Fish and Wildlife Service) needs to continue throughout project development (both formal and informal) to ensure that adequate measures are adopted to reduce or eliminate the potential for effects. Any mitigation, regulatory or non-regulatory, must be coordinated in accordance with applicable state and federal regulations. Site specific analysis will be conducted on the recommended alignment in NEPA to capture all potential impacts not identified in this study.

A wildlife underpass/es or overpass/es should be considered to allow large mammals to cross the roadway in the Denton Greenbelt and prevent animal-vehicle collisions. Passages should be considered both east and west of the Elm Fork of the Trinity River. Wildlife passages also could provide access to recreational users.

8.3.3.13 Regulated/Hazardous Materials

During the development of an alignment, a database research for potential regulated and hazardous material sites is advised. High-risk sites should be avoided to the extent possible.

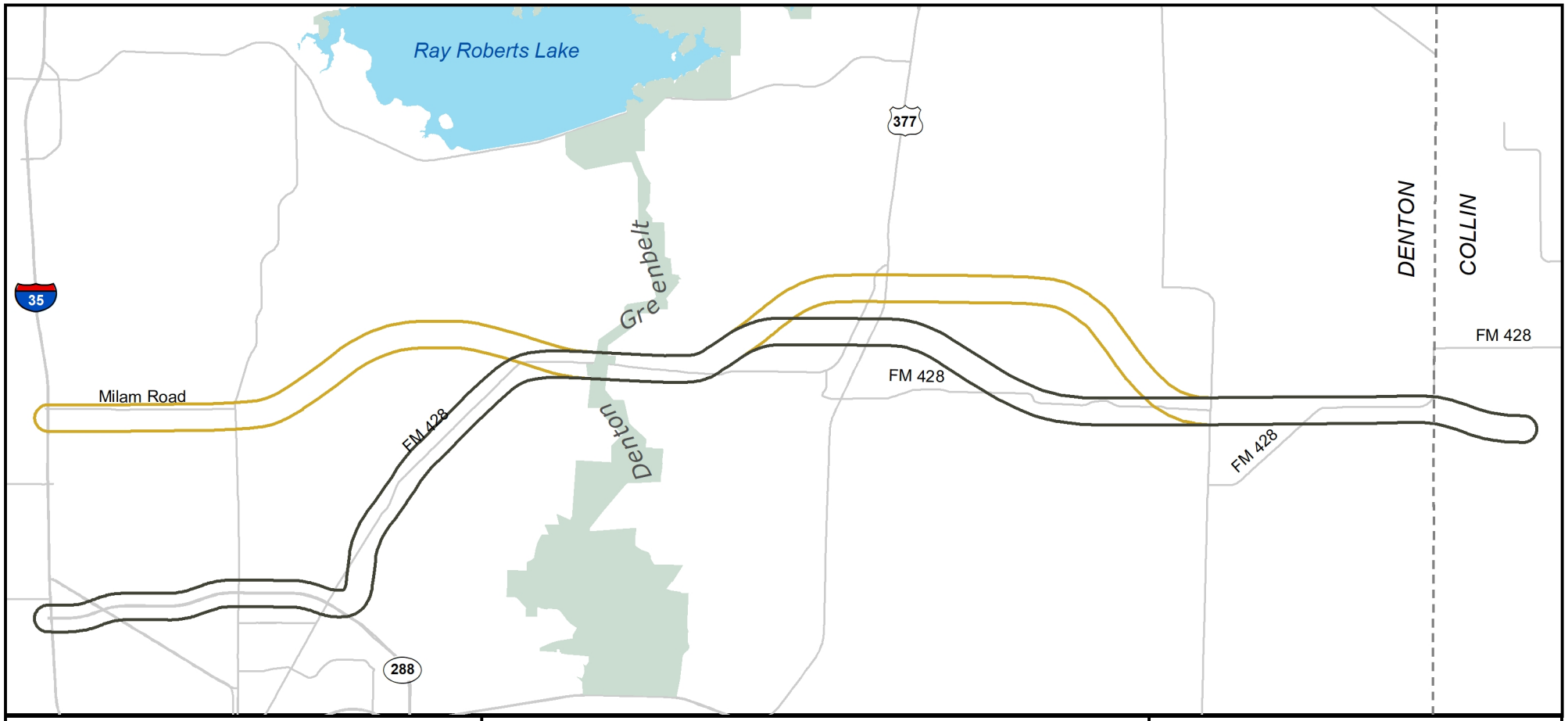
8.4 FUTURE INVOLVEMENT

NCTCOG will seek to remain involved in future phases of the Denton Greenbelt Corridor through coordination with the Texas Department of Transportation, other transportation partners, and stakeholders.

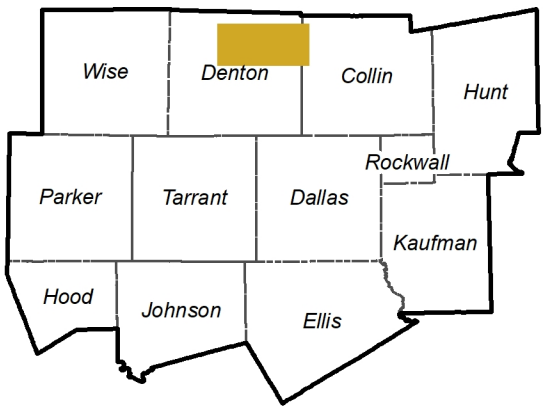
Appendix A – Maps

Figure A-1: Proposed Alignments

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



Alignment 1
Alignment 2
State Parks
Existing Roads

0 1 2 3 Miles

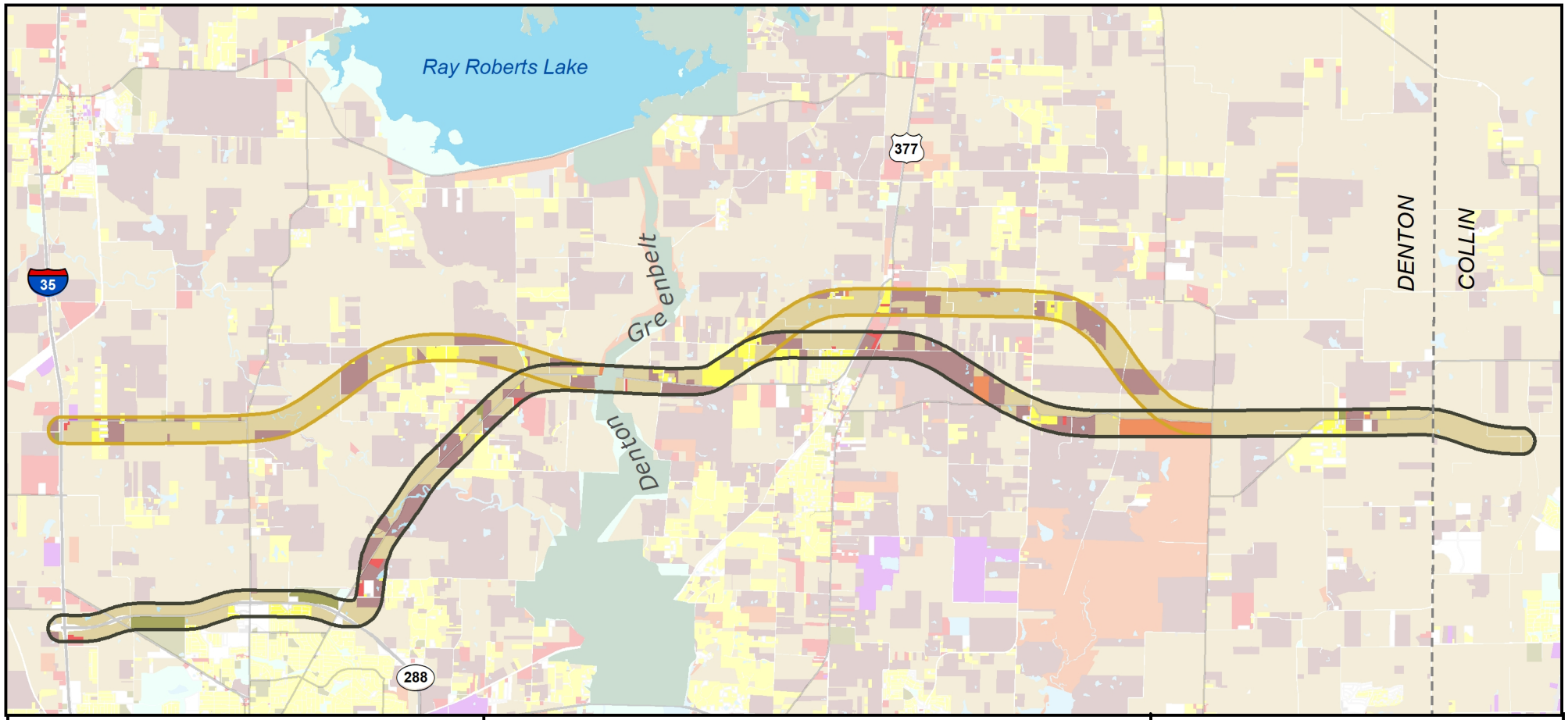
N
W E
S

North Central Texas Council of Governments

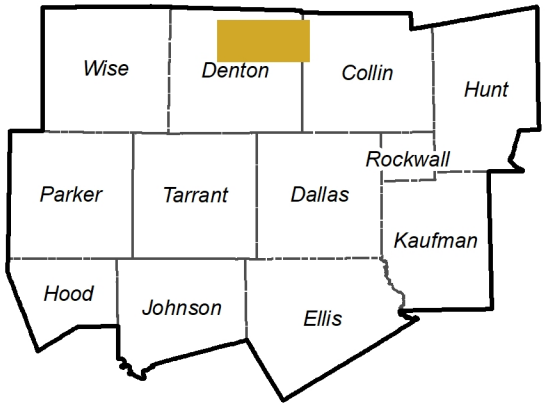
NCTCOG, 2018

Figure A-2: Land Use

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



- Alignment 1
- Alignment 2
- Existing Roads
- State Parks

Land Use Types

- Dedicated
- Commercial
- Infrastructure
- Institutional
- Farm/Ranchland
- Acreage (Improved/Residential)
- Industrial
- Residential
- Water
- Timberland
- Vacant

0 1 2 3 Miles

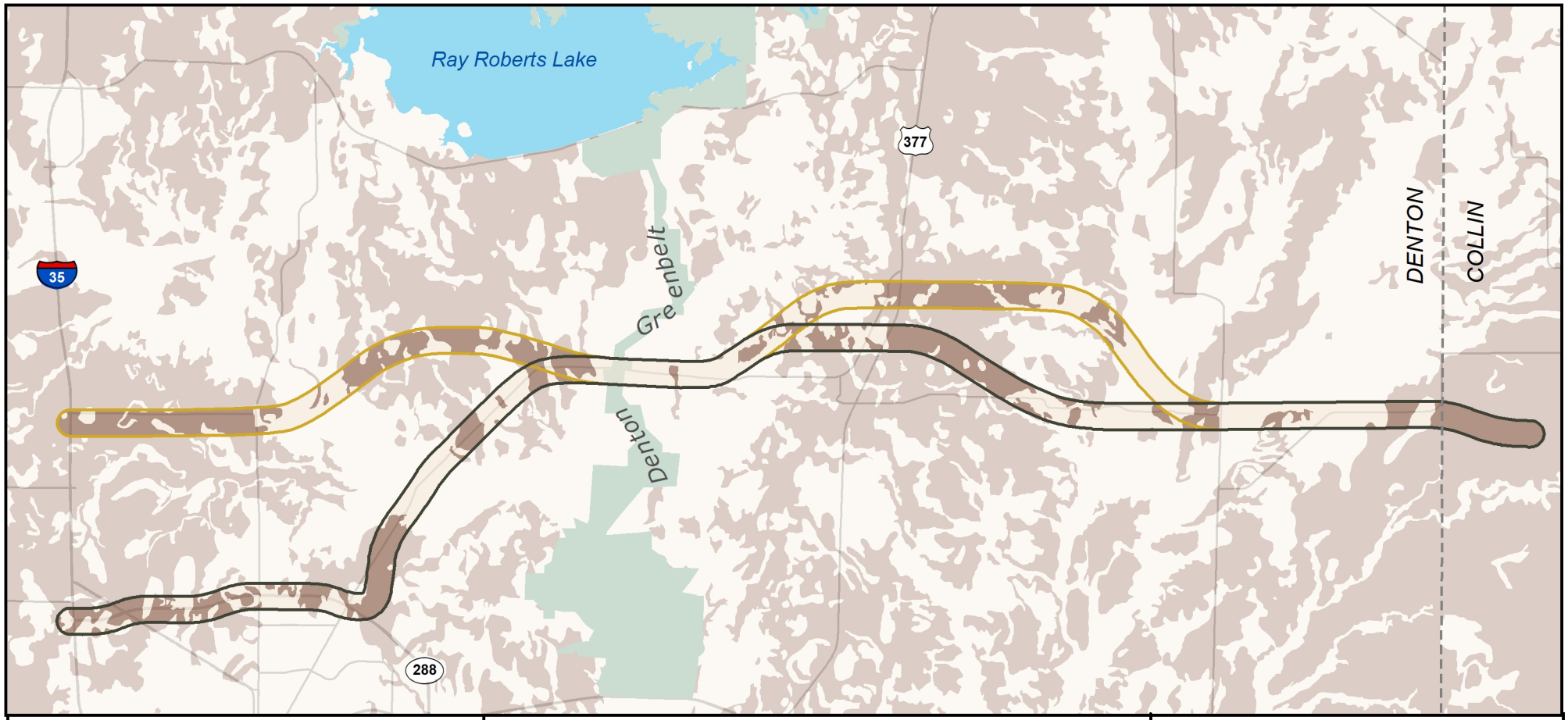
N W E S

North Central Texas Council of Governments

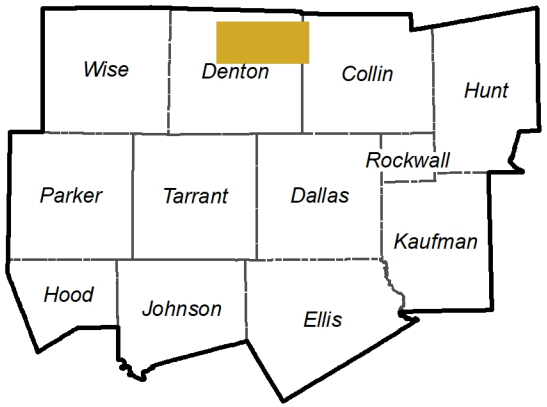
NCTCOG, 2015

Figure A-3: Farmland Soil

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



- Alignment 1
- Alignment 2
- State Parks
- Existing Roads
- Prime Farmland
- Not Prime Farmland

0 1 2 3 Miles

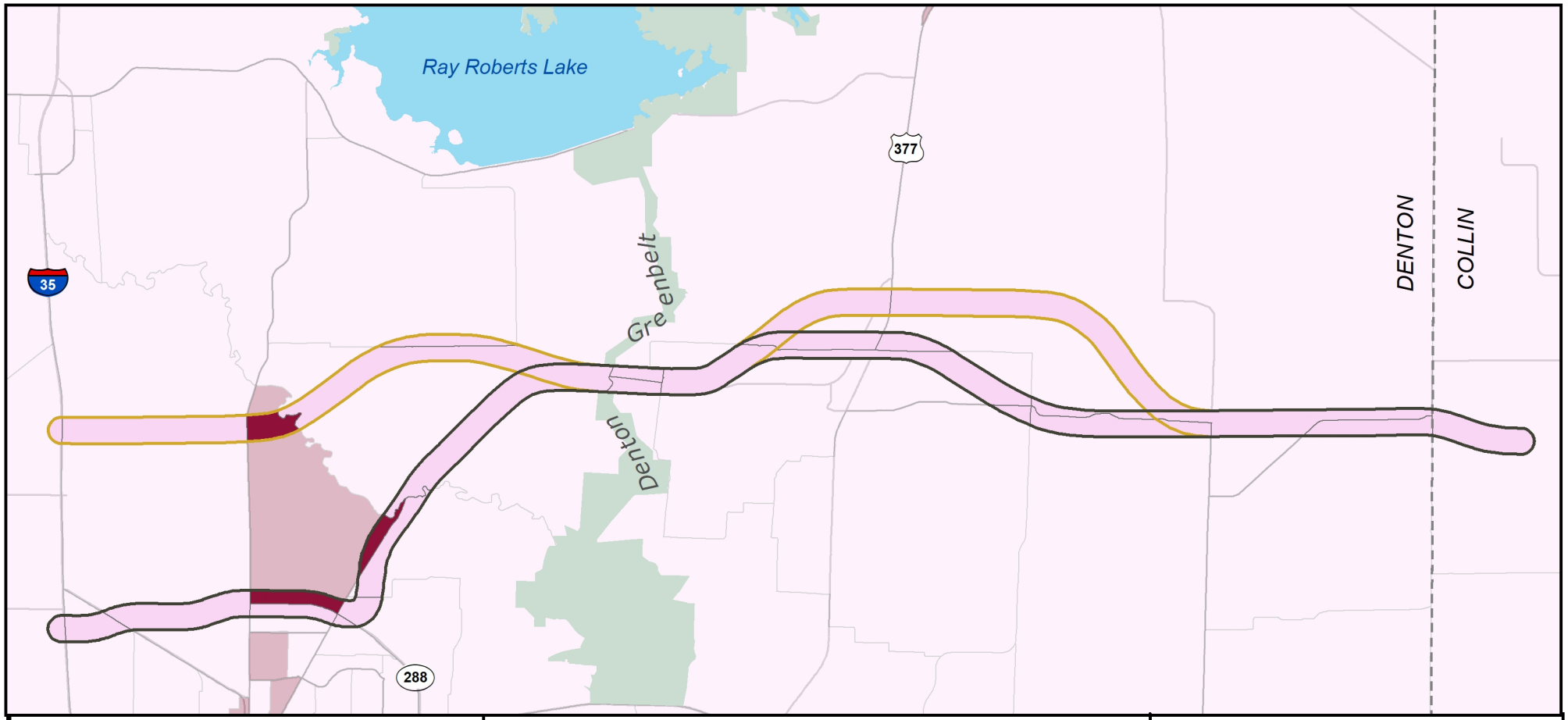
N W E S

North Central Texas Council of Governments

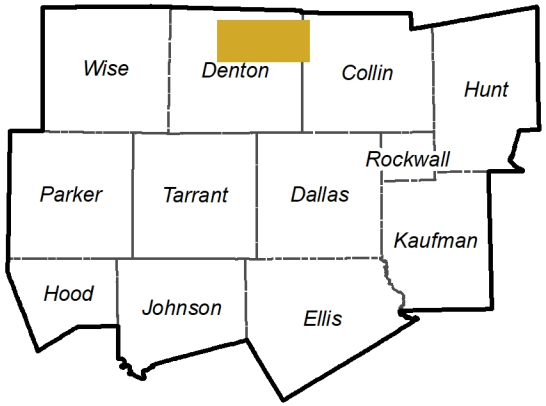
NRCS, 2018

Figure A-4: Percent of Total Minority Populations

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



Alignment 1
Alignment 2
State Parks
Existing Roads

Percent of Minority

0%-49.9%
50%-100%

0 1 2 3 Miles

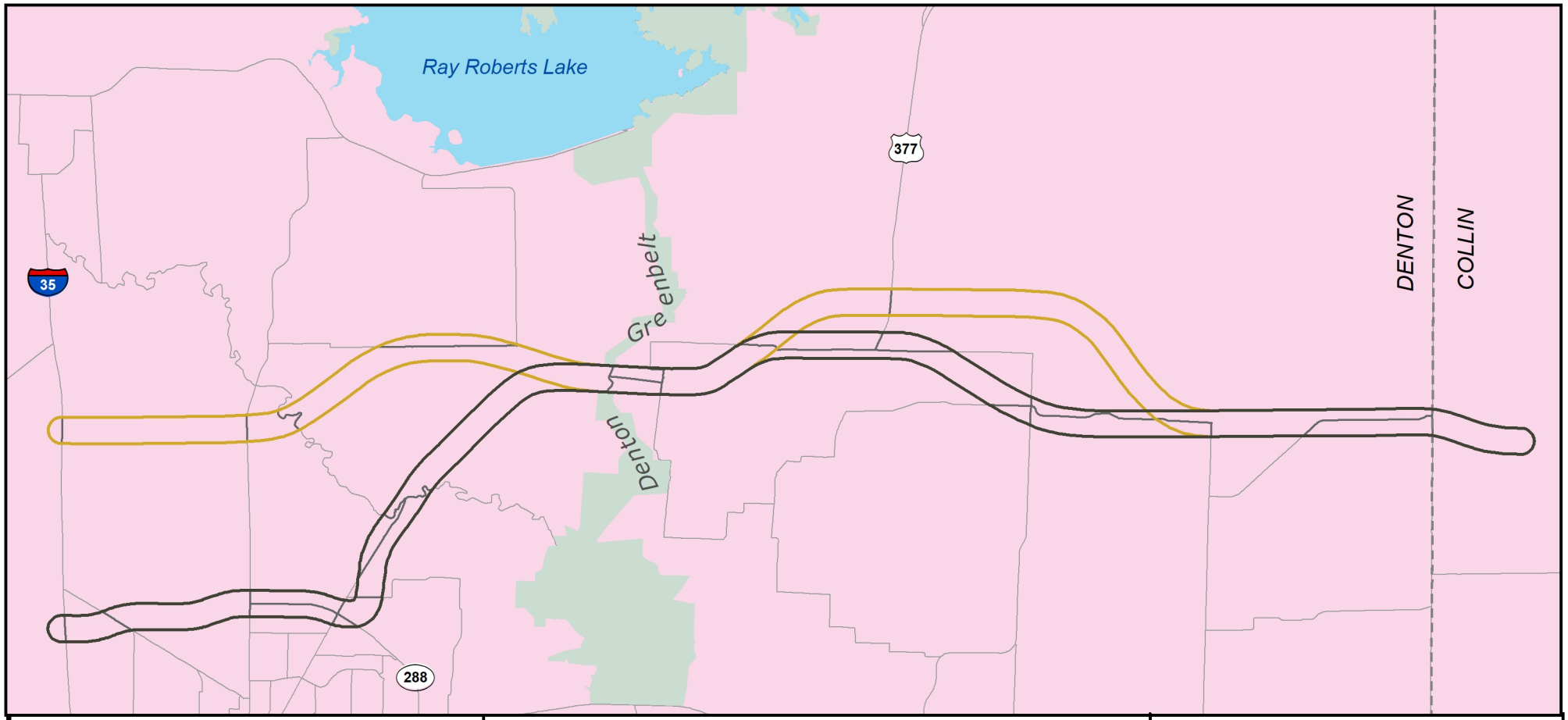
N
W E
S

North Central Texas Council of Governments

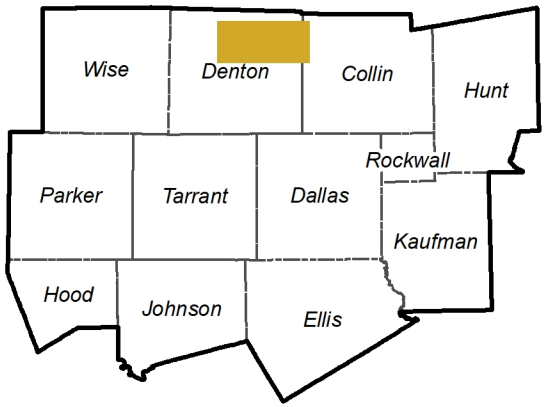
ACS, 2011-2015

Figure A-5: Below Poverty Populations

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



- Alignment 1
- Alignment 2
- State Parks
- Existing Roads
- Above Poverty Threshold*

**The poverty threshold used is for a family of four, set by the U.S. Department of Human and Health Services. In 2017, this threshold was $25,094.*

0 1 2 3 Miles

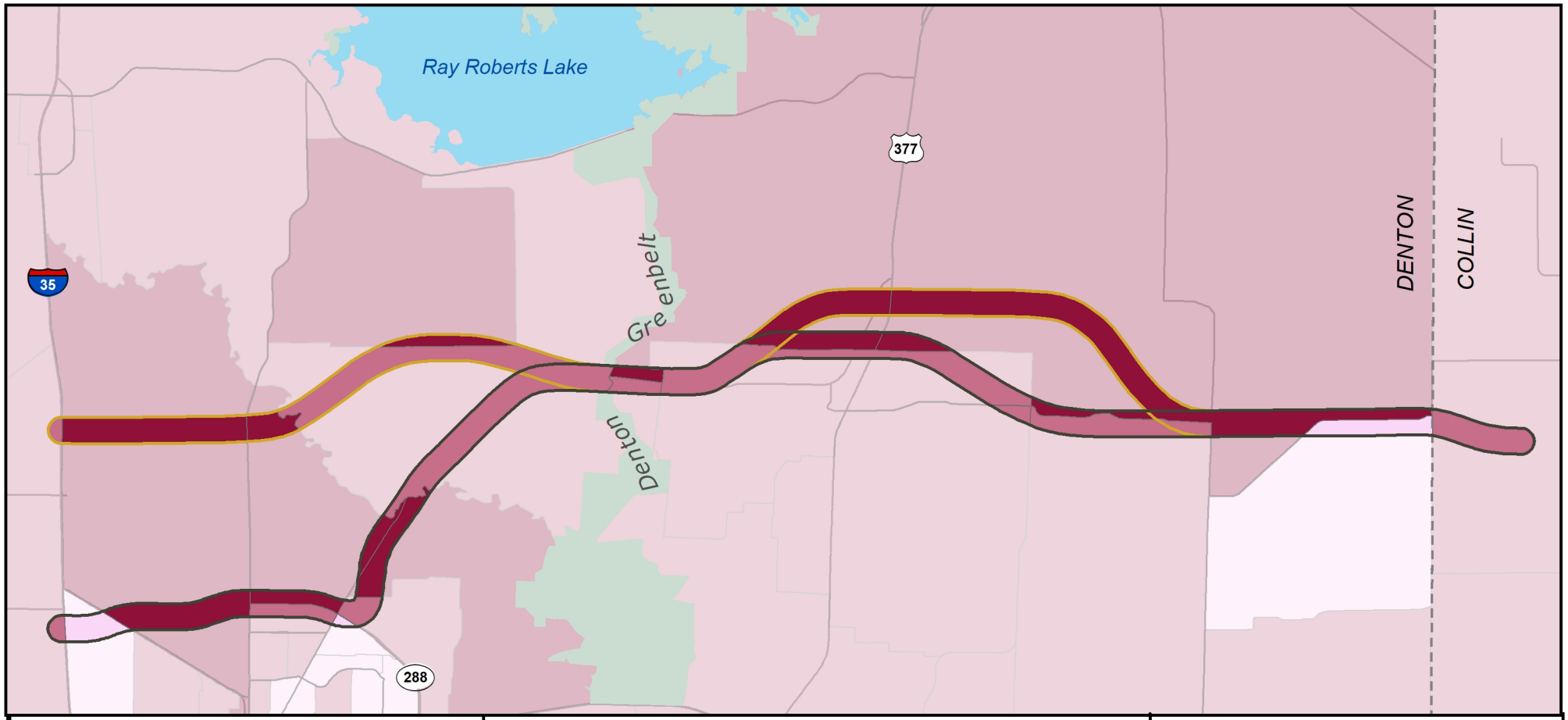
N W E S

North Central Texas Council of Governments

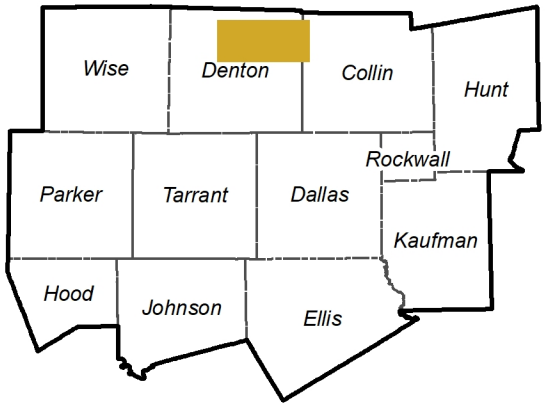
ACS, 2011-2015

Figure A-6: Percent of Limited English Proficiency

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



Alignment 1
Alignment 2
State Parks
Existing Roads

Percent Total LEP

0%
0.1% - 9.9%
10% - 20%

0 1 2 3 Miles

N
W E
S

North Central Texas Council of Governments

ACS, 2011-2015

Figure A-7: Environmental Justice Index

Denton Greenbelt Corridor Feasibility Study

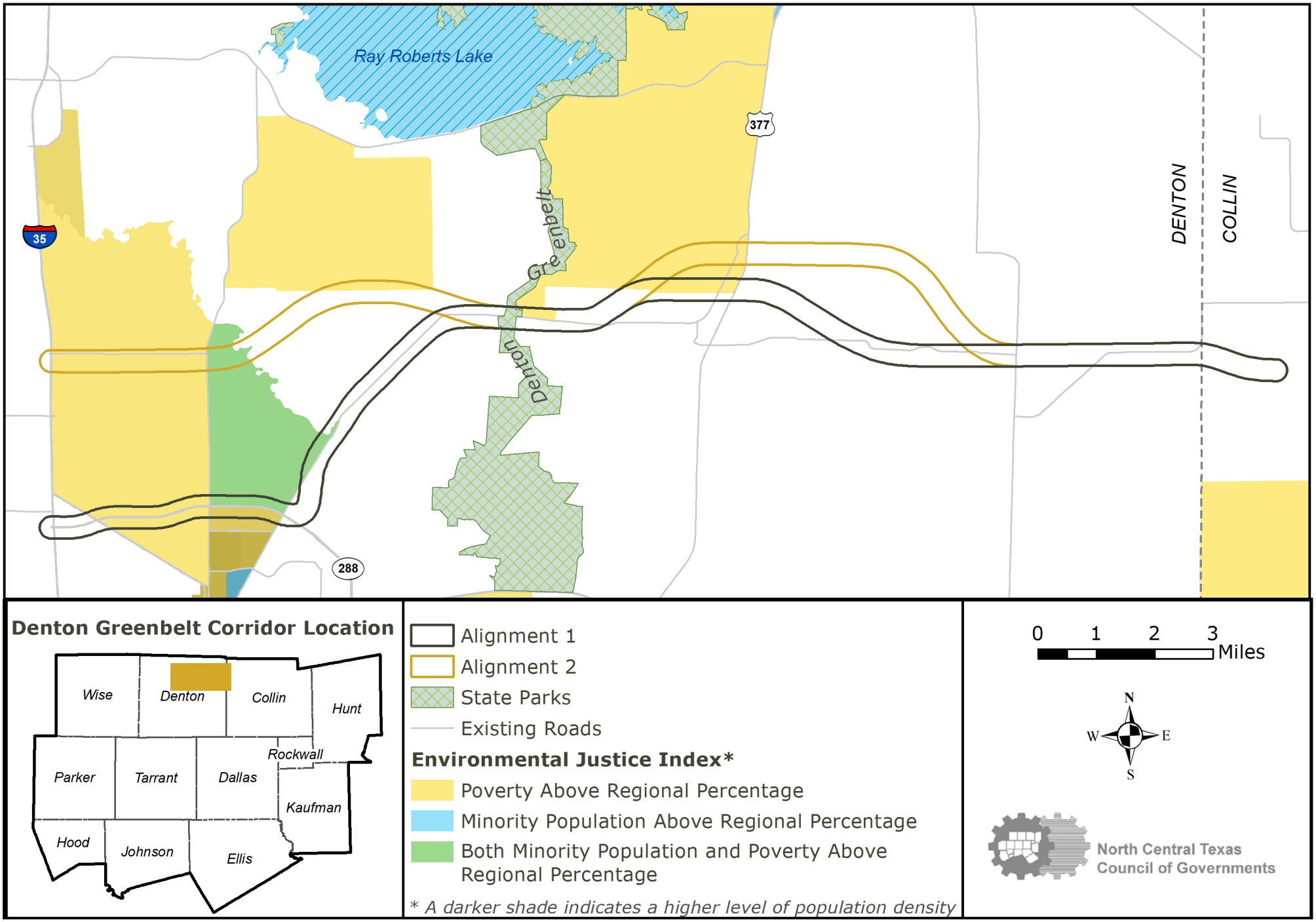
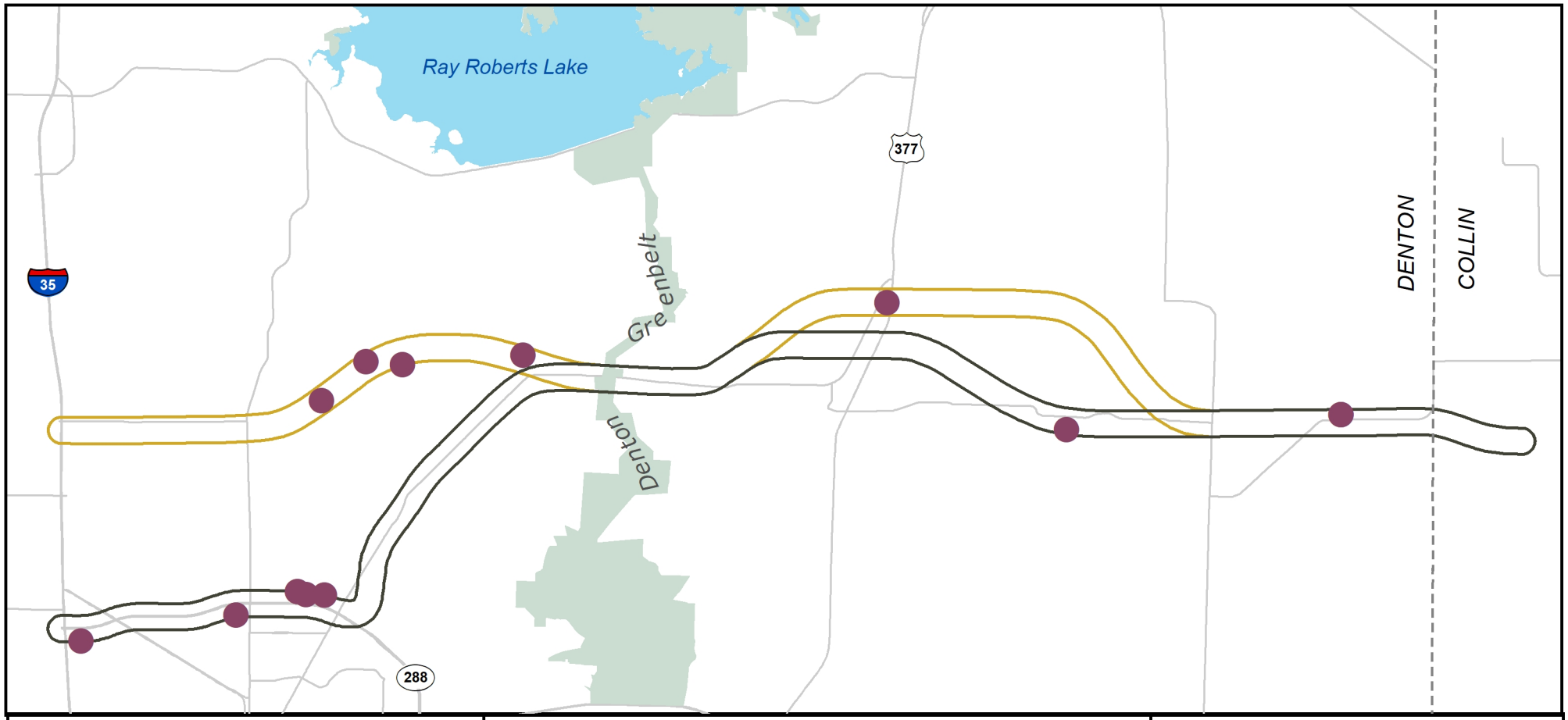
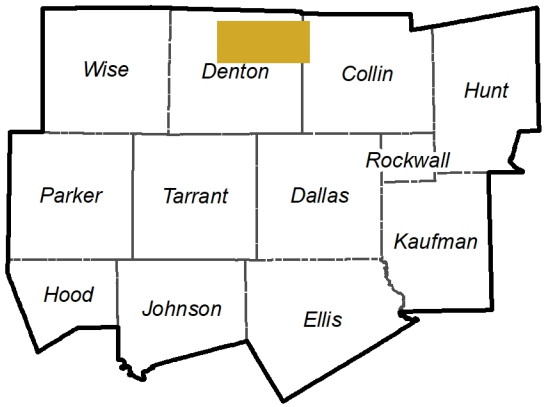


Figure A-8: Community Facilities

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



- Alignment 1
- Alignment 2
- State Parks
- Existing Roads
- Community Facilities

0 1 2 3 Miles

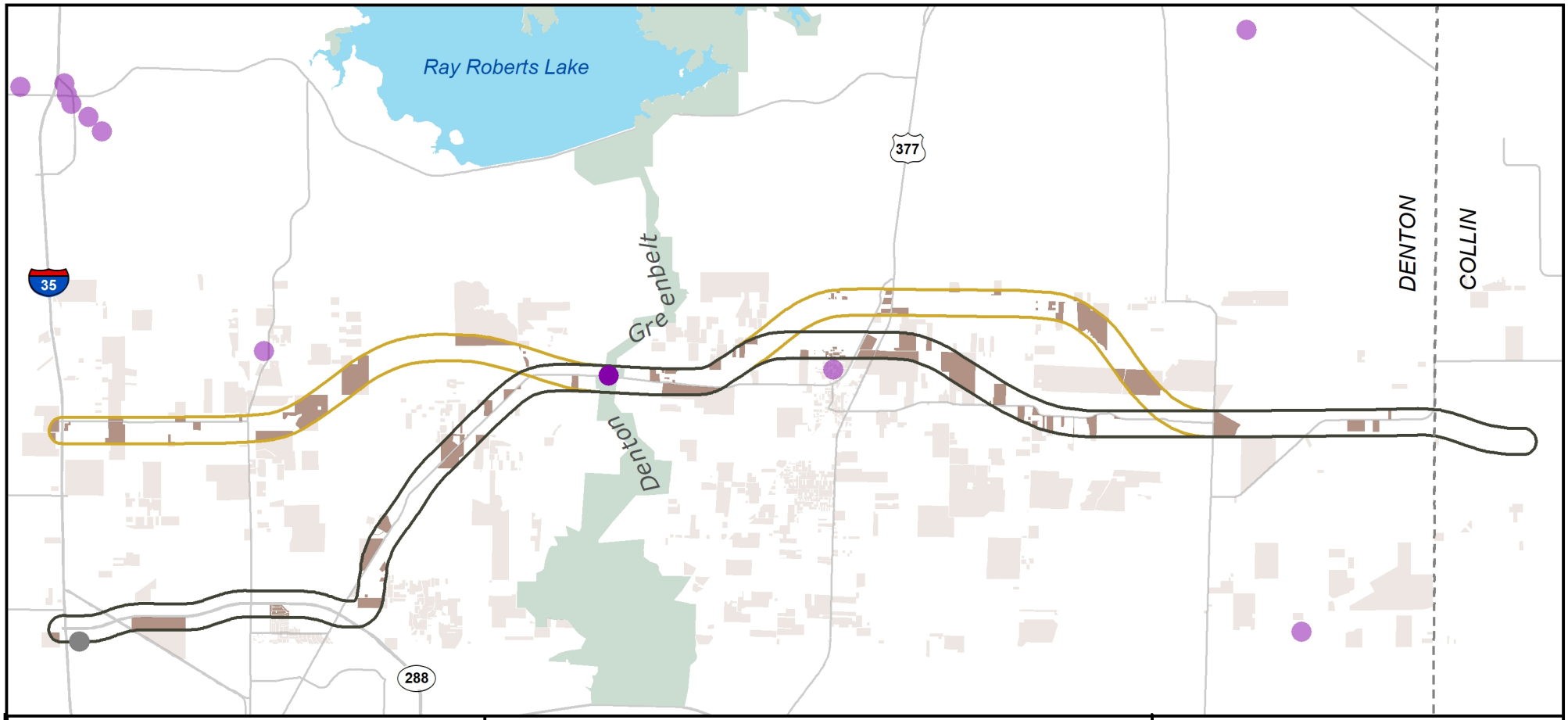
N W E S

North Central Texas Council of Governments

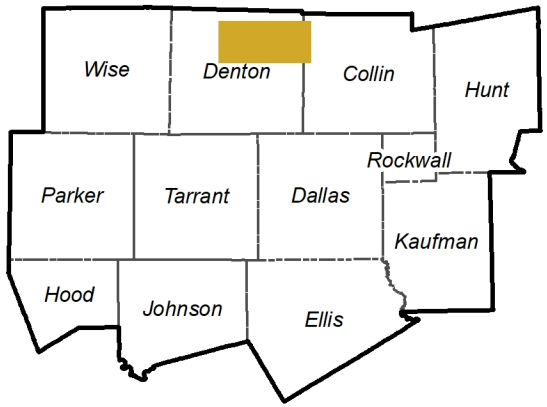
NCTCOG, 2017

Figure A-9: Historic-Age Resources

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



- Alignment 1
- Alignment 2
- State Parks
- Existing Roads
- Historical Markers
- Museums
- Parcels with Potential Historic-Age Structures

0 1 2 3 Miles

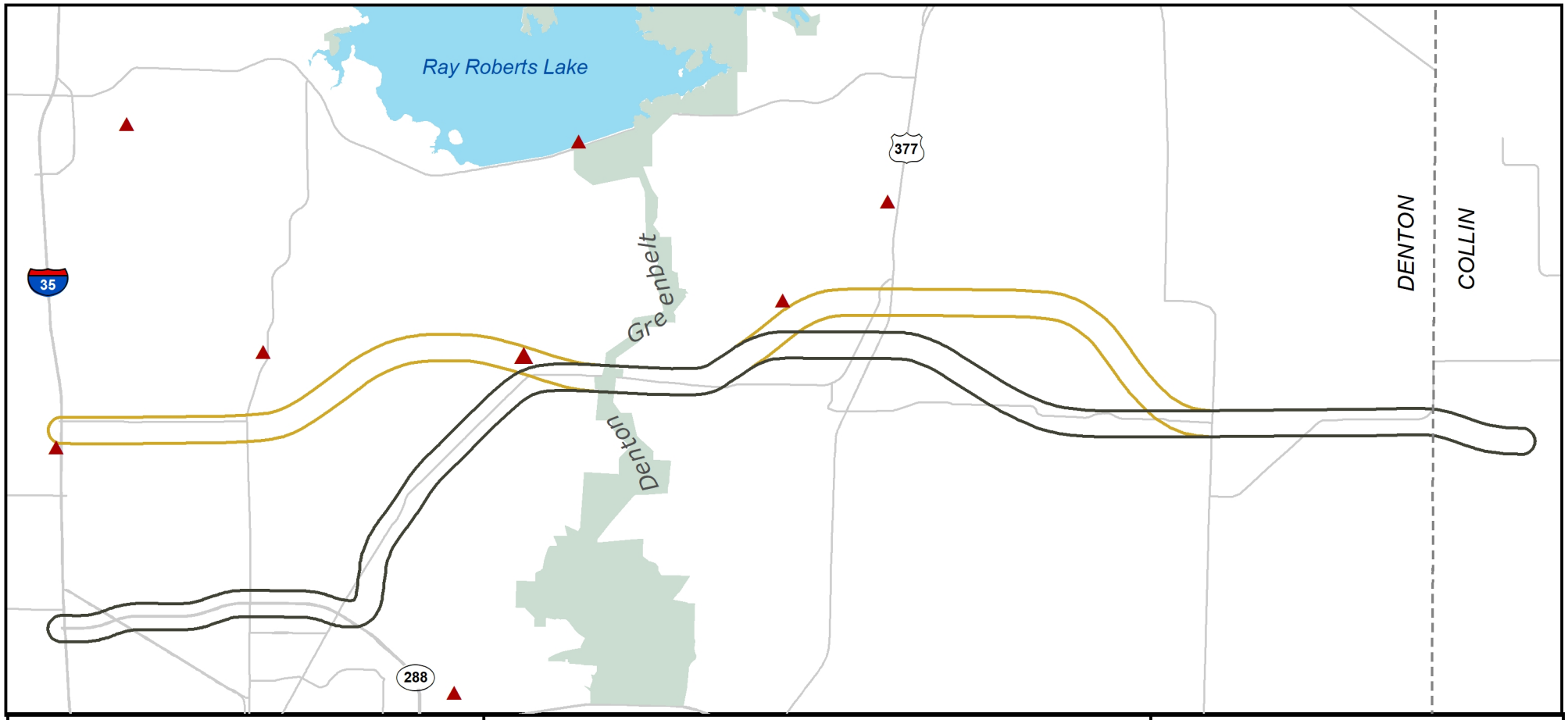
N W E S

North Central Texas Council of Governments

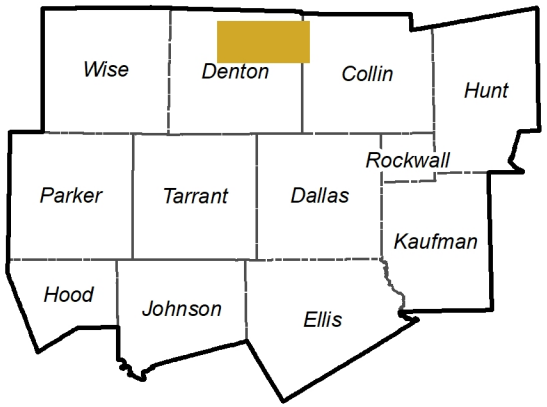
NCTCOG, 2017; THC, 2018

Figure A-10: Cemeteries

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



- Alignment 1
- Alignment 2
- State Parks
- Existing Roads
- Cemeteries

0 1 2 3 Miles

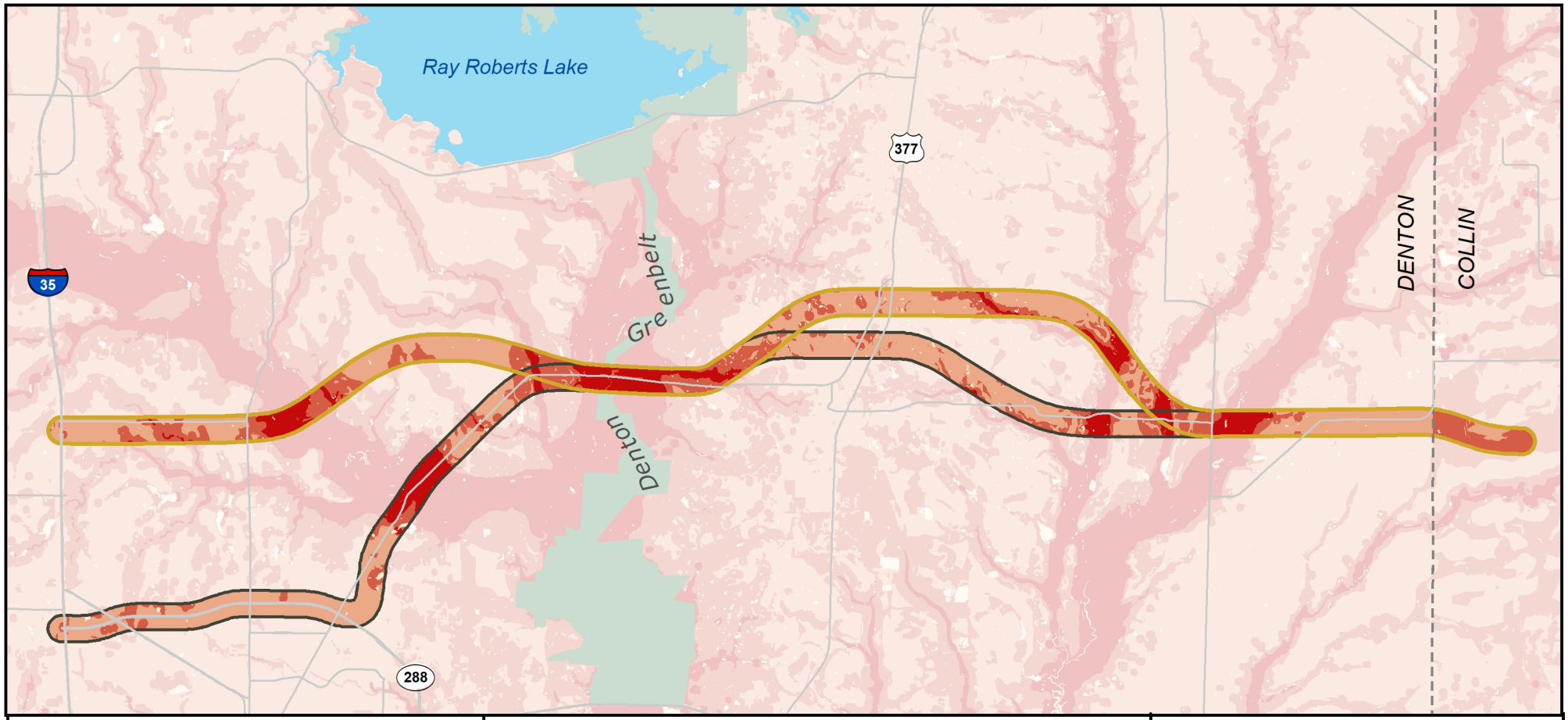
N W E S

North Central Texas Council of Governments

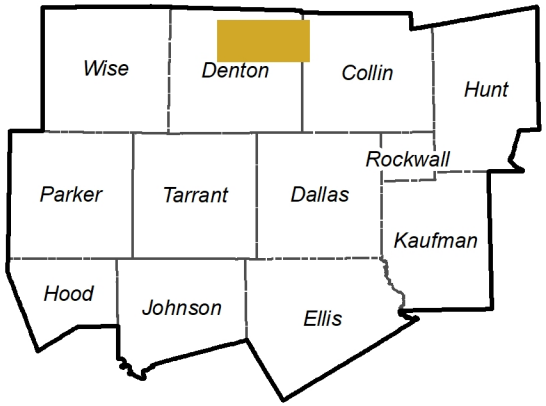
THC, 2018

Figure A-11: Hybrid Potential Archeological Maps (Shallow Depth)

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



Alignment 1
Alignment 2
State Parks
Existing Roads

Potential
Negligible
Low
Moderate
High

0 1 2 3 Miles

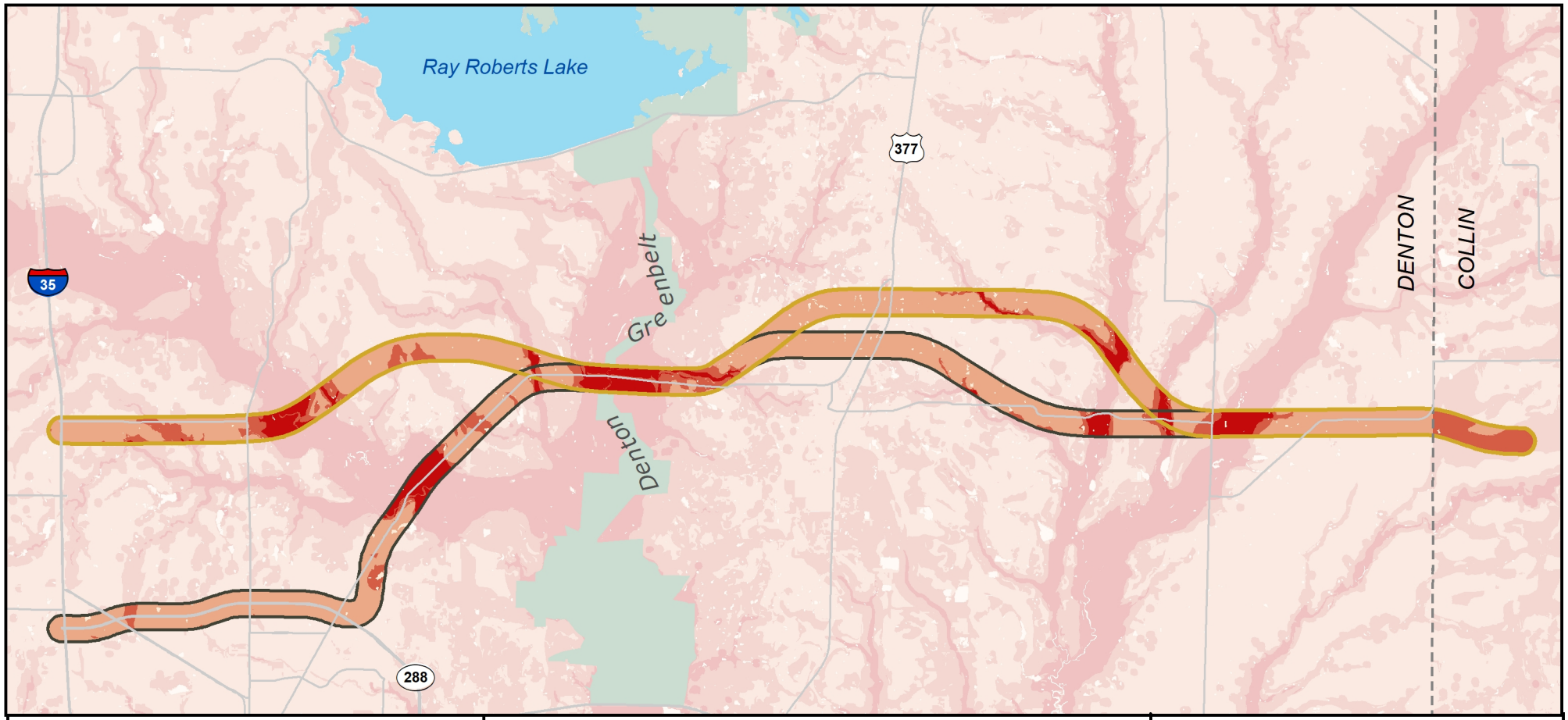
N
W E
S

North Central Texas Council of Governments

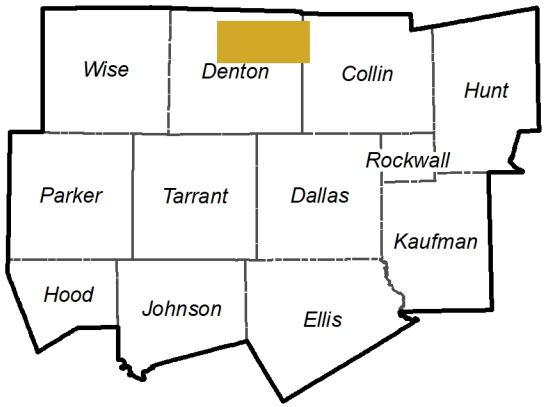
TxDOT, N.D.

Figure A-12: Hybrid Potential Archeological Maps (Deep Depth)

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



Alignment 1
Alignment 2
State Parks
Existing Roads

Potential
Negligible
Low
Moderate
High

0 1 2 3 Miles

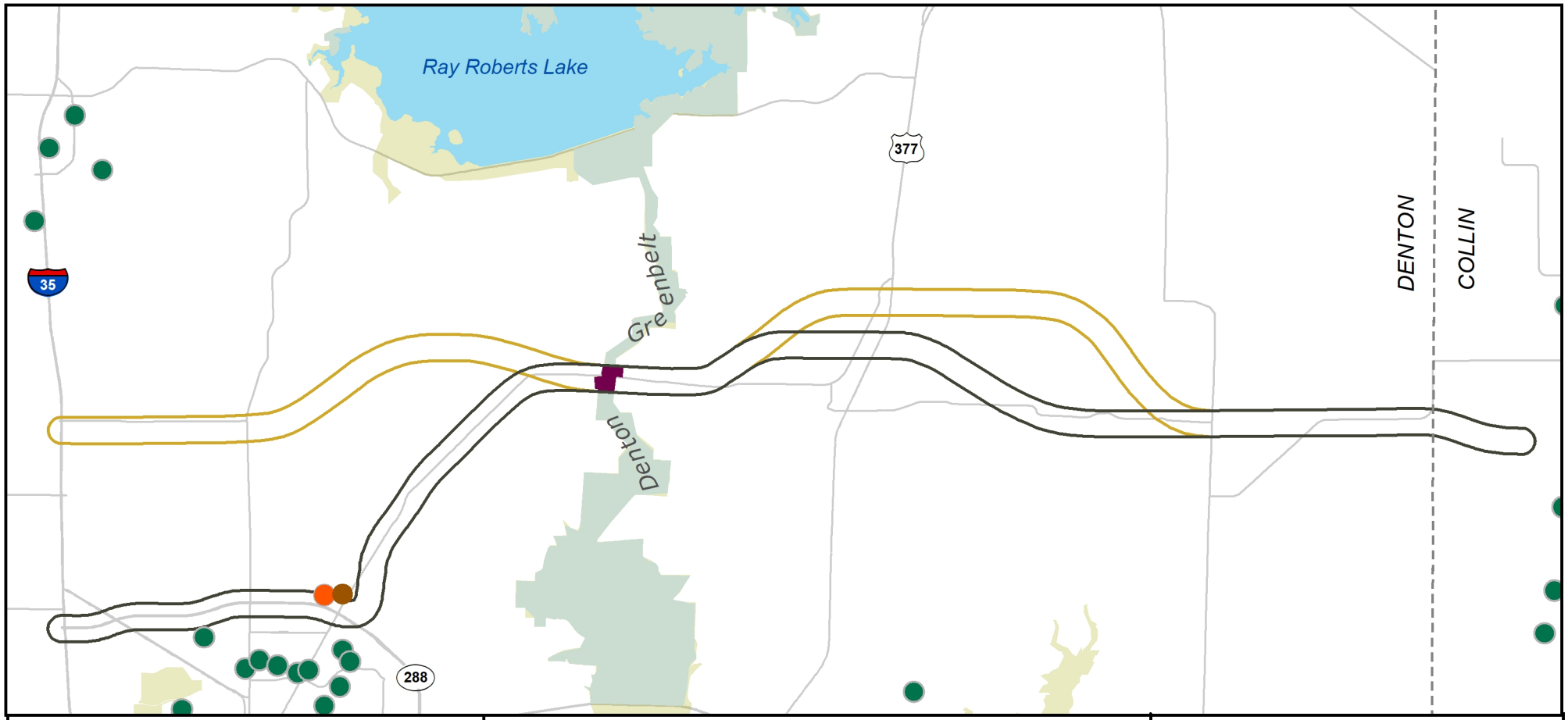
N
W E
S

North Central Texas Council of Governments

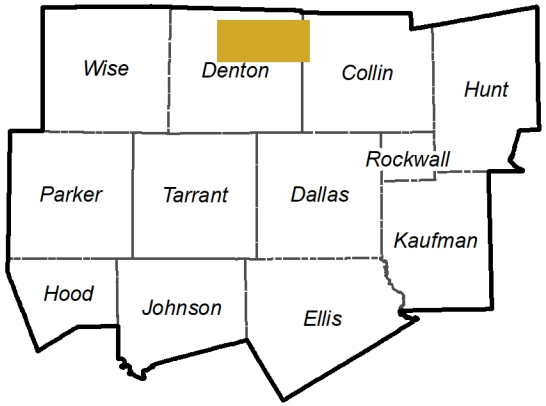
TxDOT, N.D.

Figure A-13: Parks and Recreational Areas

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



- Alignment 1
- Alignment 2
- State Parks
- Existing Roads
- Amusement Park
- Stadium/Arena
- Local Park
- Other Large Park Areas
- Conservation Easement

0 1 2 3 Miles

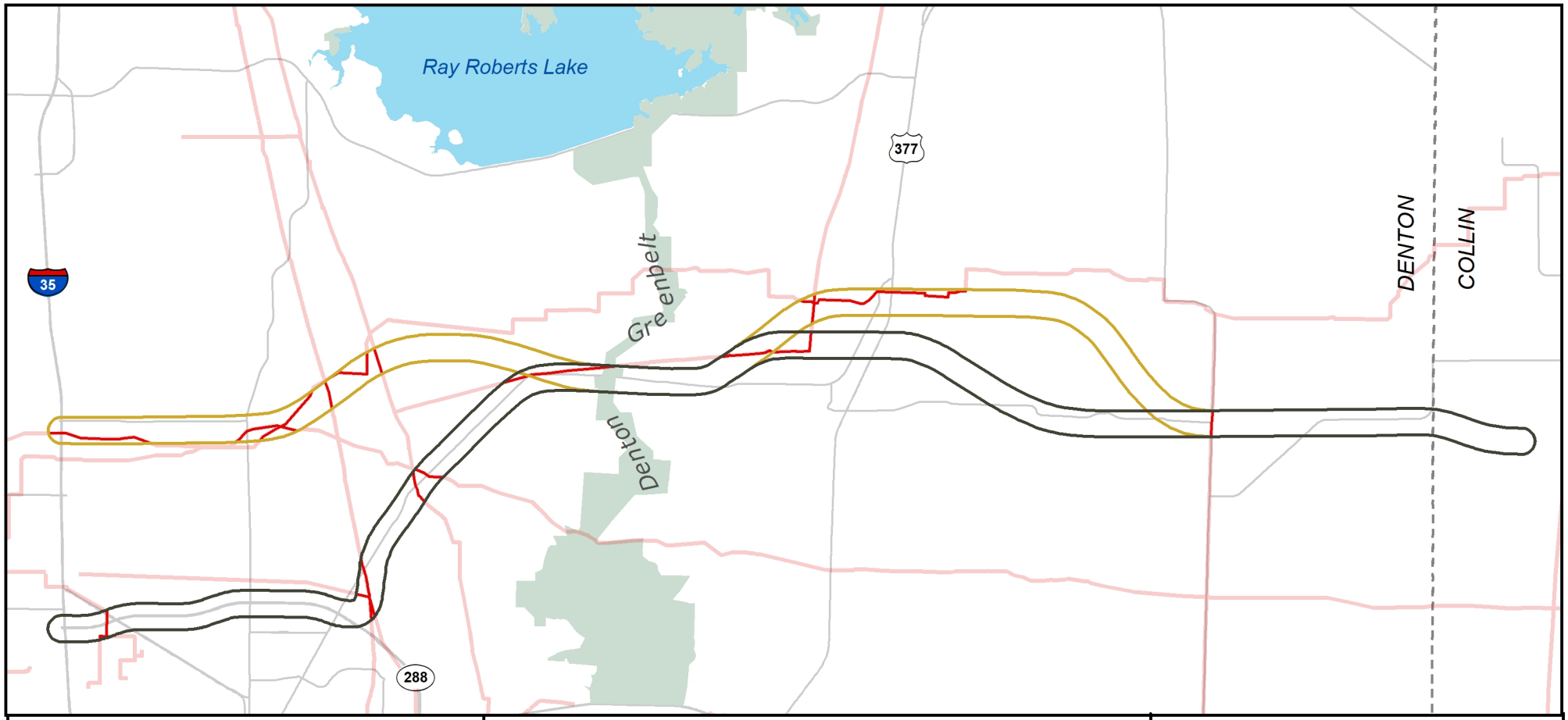
N W E S

North Central Texas Council of Governments

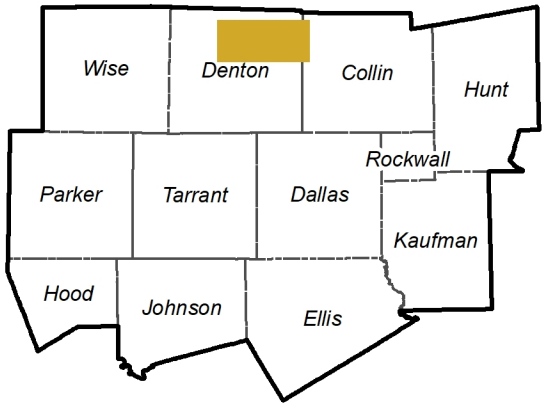
NCTCOG 2015, 2017; USGS 2016

Figure A-14: Pipelines

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



- Alignment 1
- Alignment 2
- State Parks
- Existing Roads
- Pipelines

0 1 2 3 Miles

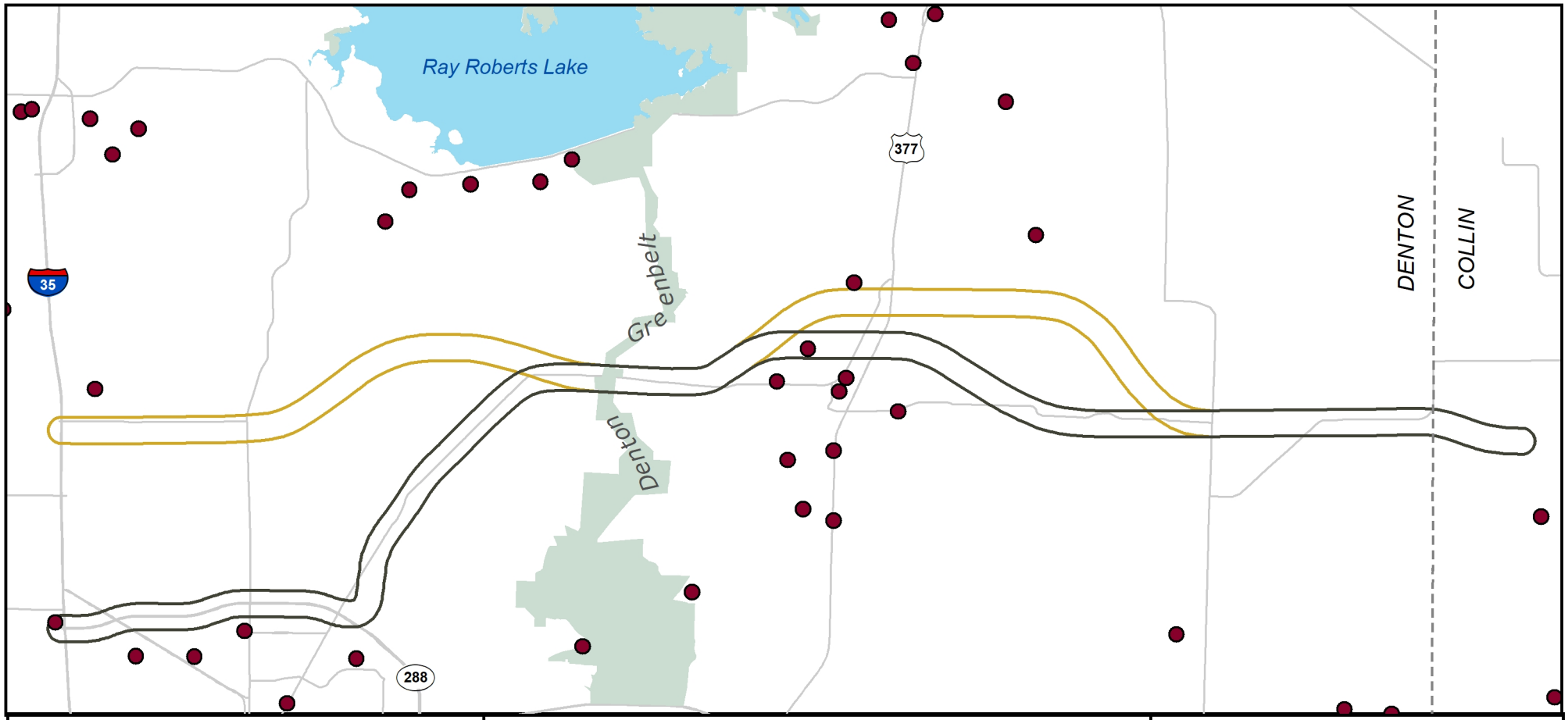
N W E S

North Central Texas Council of Governments

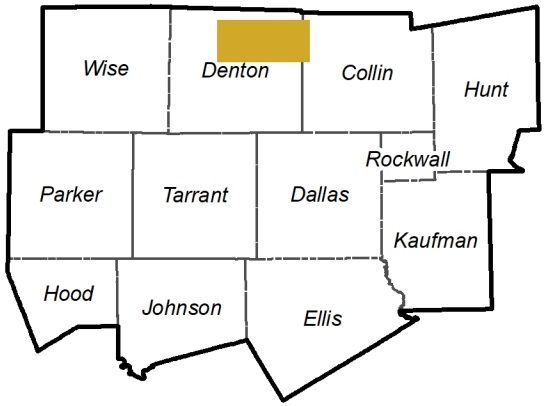
RRC, 2008

Figure A-15: Utilities

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



- Alignment 1
- Alignment 2
- State Parks
- Existing Roads
- Utilities

0 1 2 3 Miles

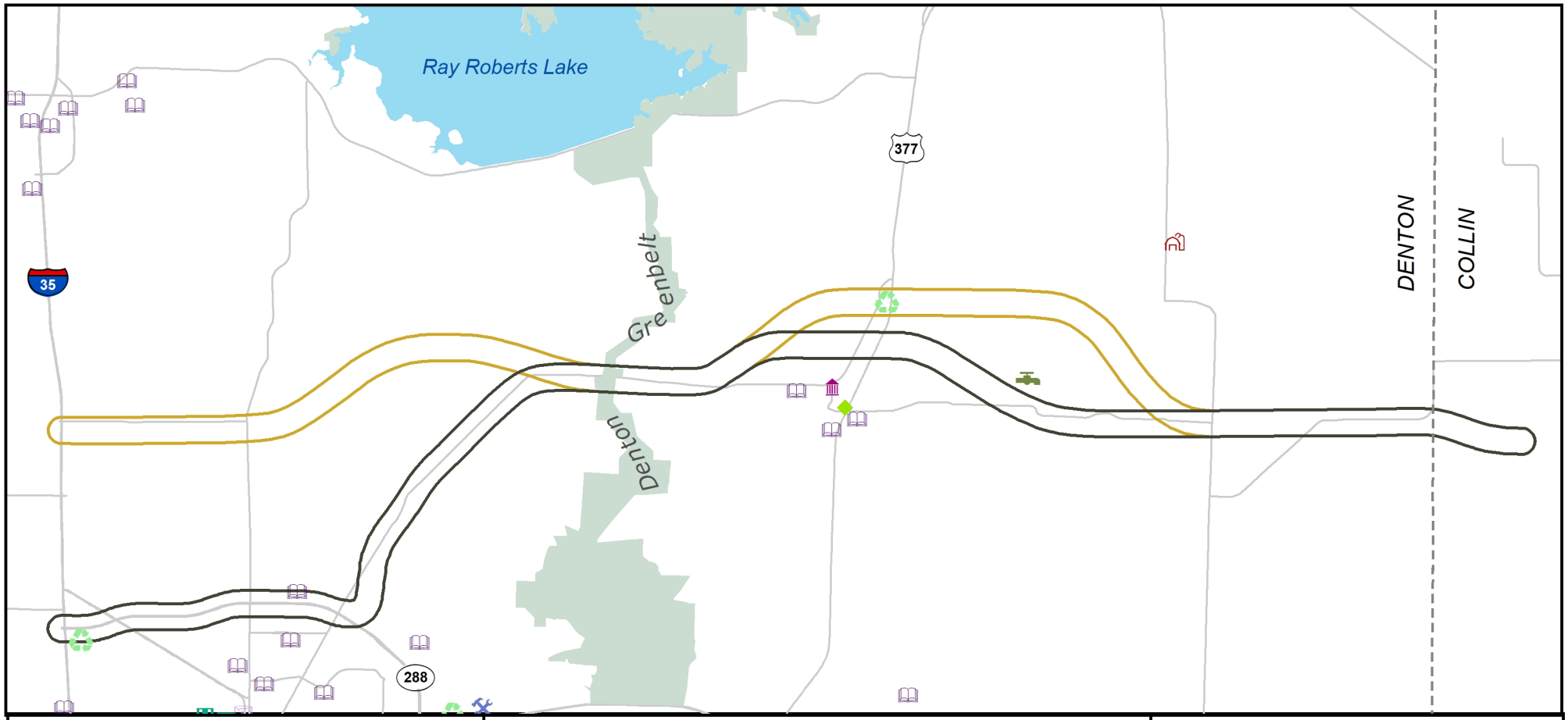
N
W E
S

North Central Texas Council of Governments

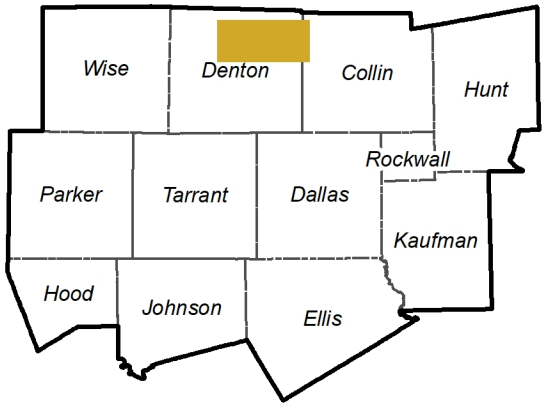
NCTCOG, 2015

Figure A-16: Employment by Industry

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



- Alignment 1
- Alignment 2
- State Parks
- Existing Roads

Industry Type

- Administrative, Support, and Waste Management Services
- Agriculture, Forestry, Fishing, and Hunting
- Educational Services
- Manufacturing
- Mining
- Other Services
- Public Administration
- Utilities

0 1 2 3 Miles

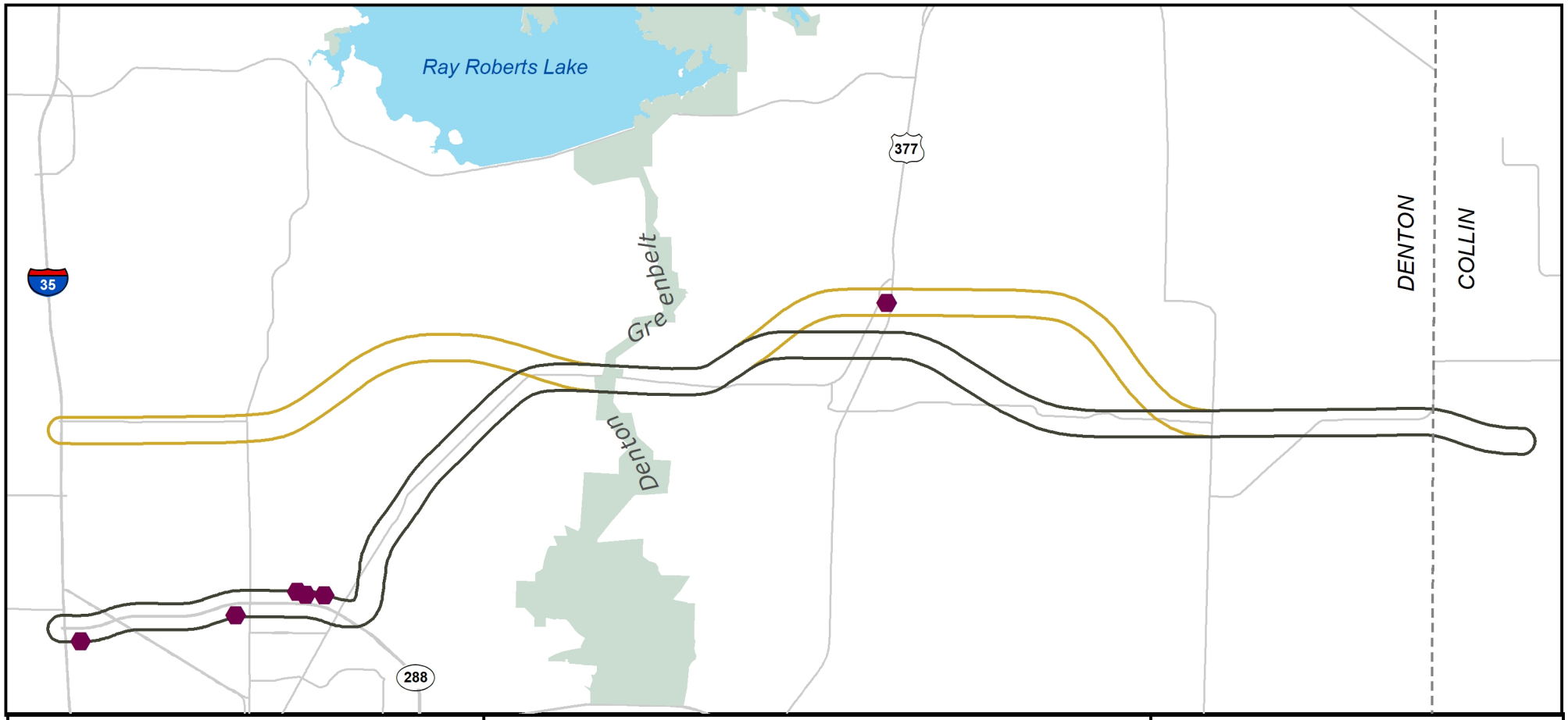
N W E S

North Central Texas Council of Governments

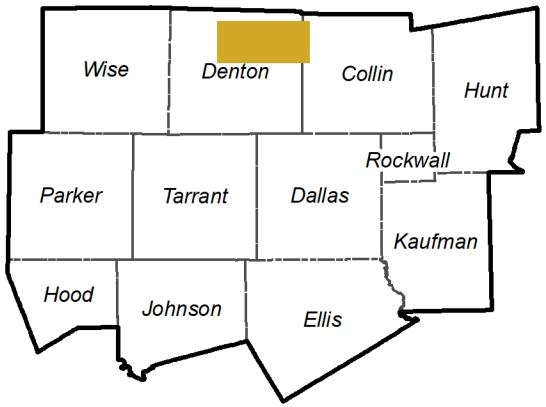
NCTCOG, 2017

Figure A-17: Future Developments

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



- Alignment 1
- Alignment 2
- State Parks
- Existing Roads
- Future Developments

0 1 2 3 Miles

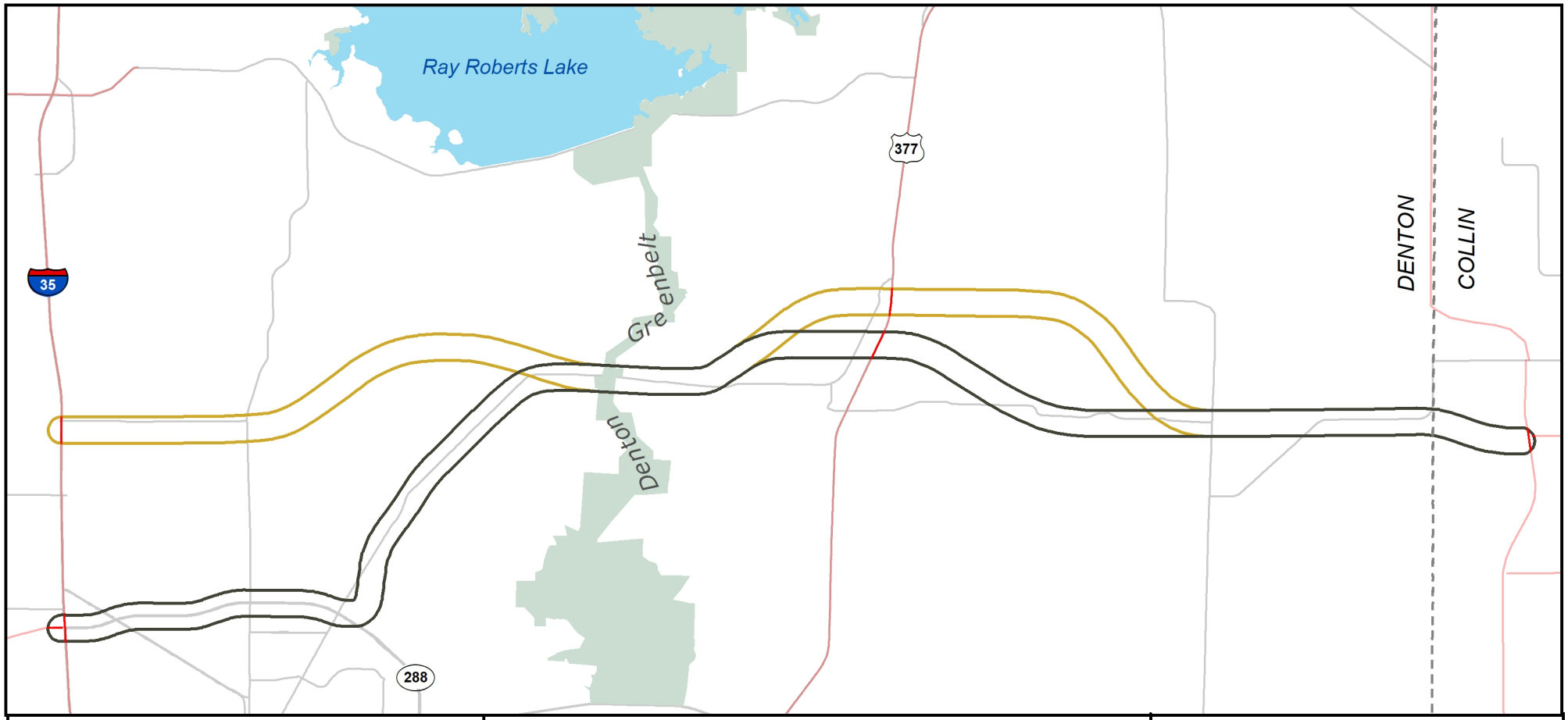
N W E S

North Central Texas Council of Governments

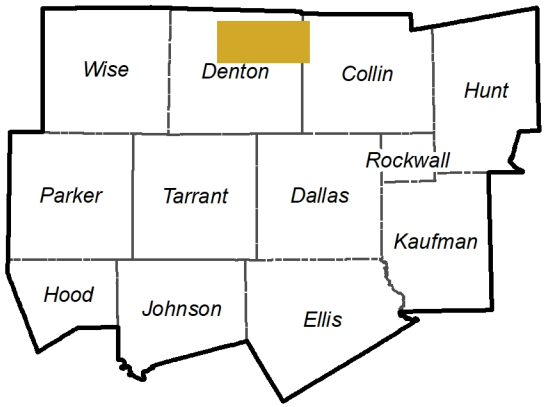
NCTCOG, 2016

Figure A-18: Congestion Management Process Projects

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



Alignment 1
Alignment 2
State Parks
Existing Roads
CMP Projects

0 1 2 3 Miles

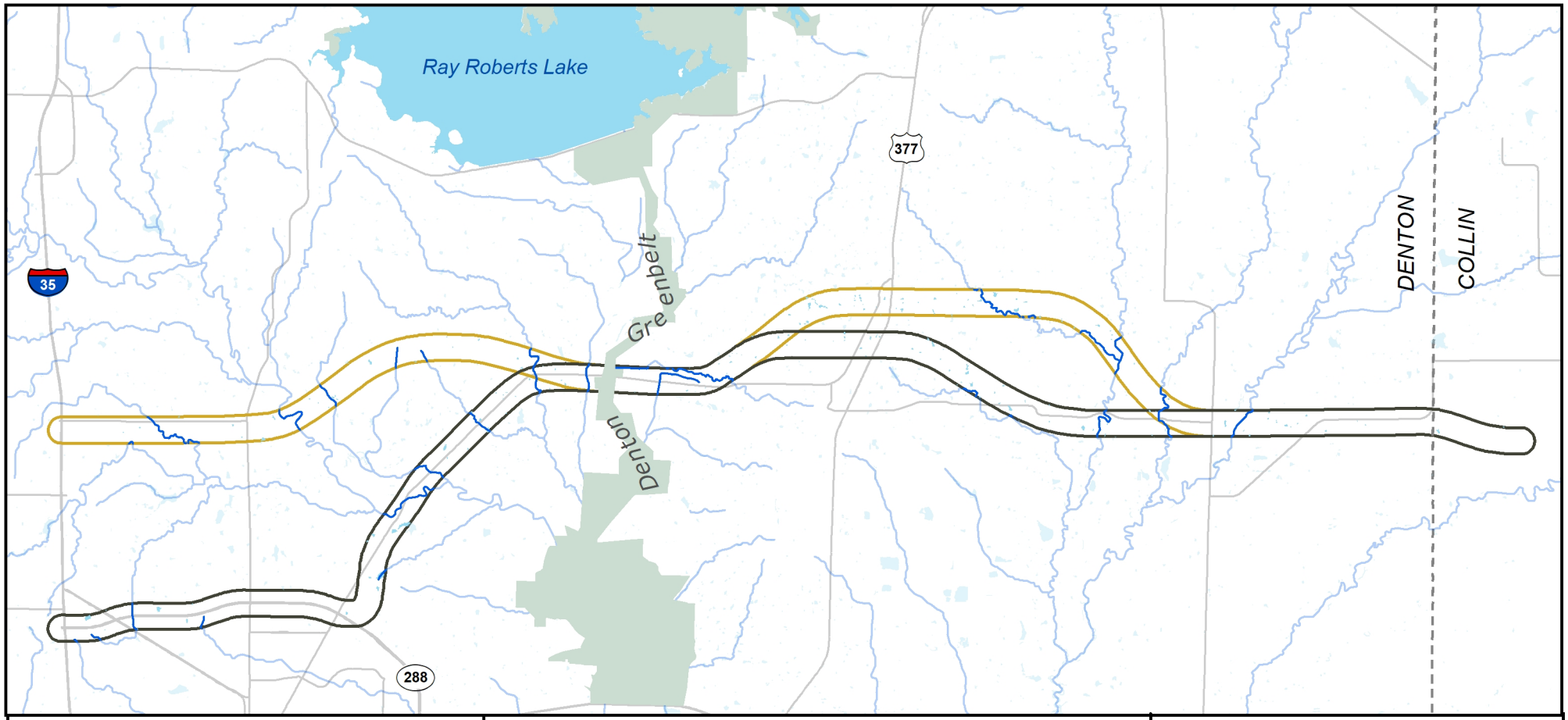
N
W E
S

North Central Texas Council of Governments

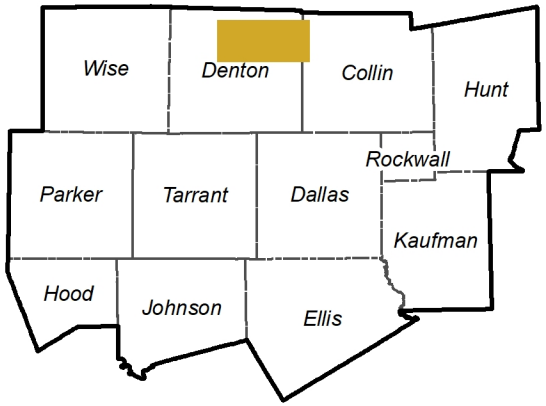
NCTCOG, TIPINS, 2018

Figure A-19: Streams, Lakes, and Ponds

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



Alignment 1
Alignment 2
State Parks
Existing Roads
Streams
Lakes and Ponds

0 1 2 3 Miles

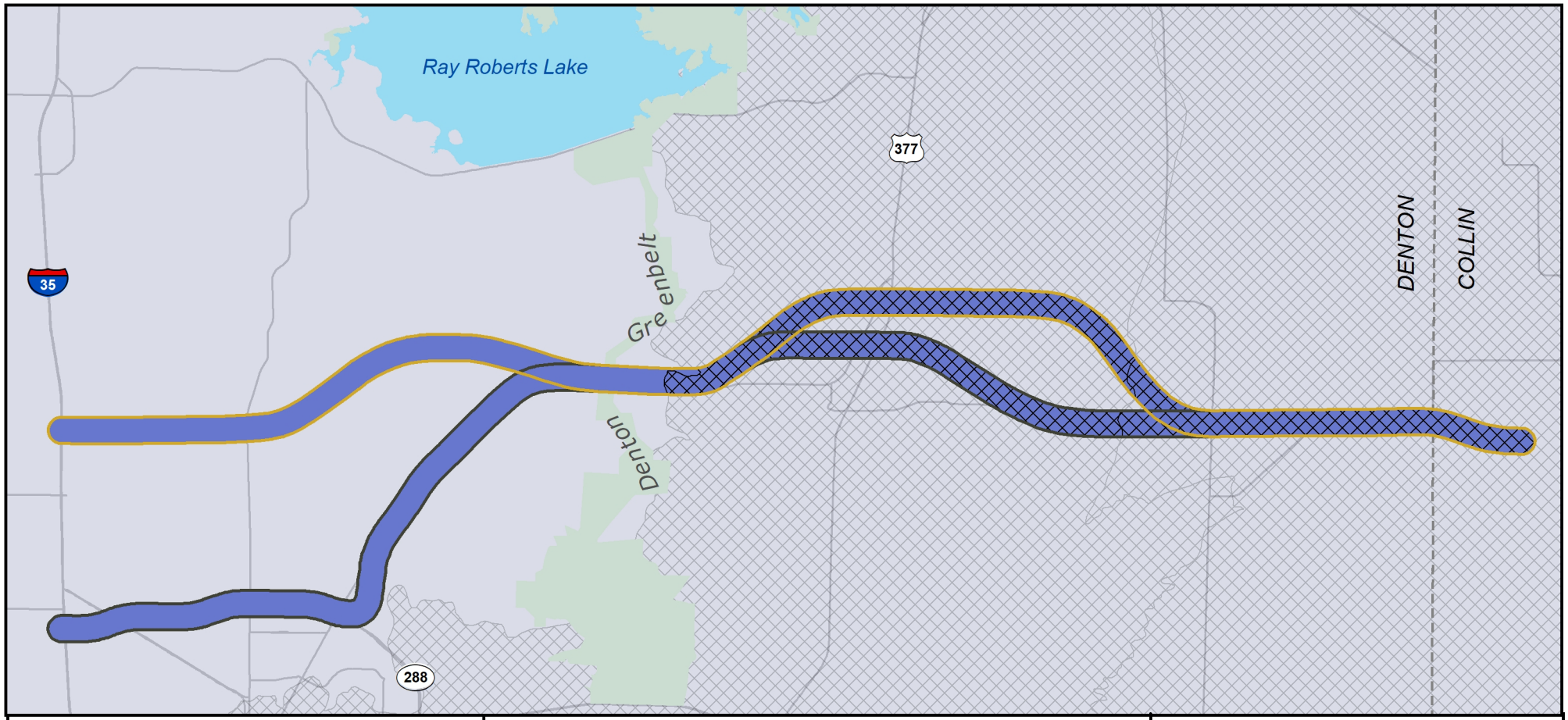
N
W E
S

North Central Texas Council of Governments

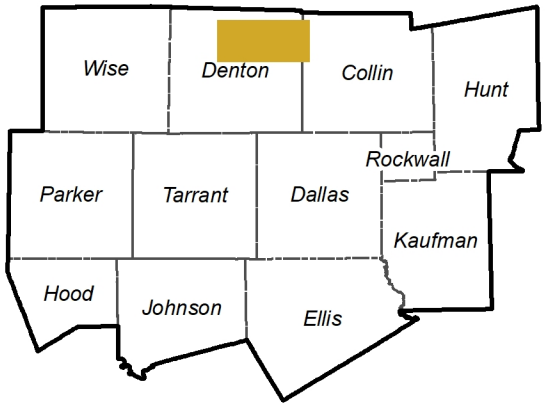
NHD, 2016

Figure A-20: Major and Minor Aquifers

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



- Alignment 1
- Alignment 2
- State Parks
- Existing Roads
- Woodbine Minor Aquifer
- Trinity Major Aquifer

0 1 2 3 Miles

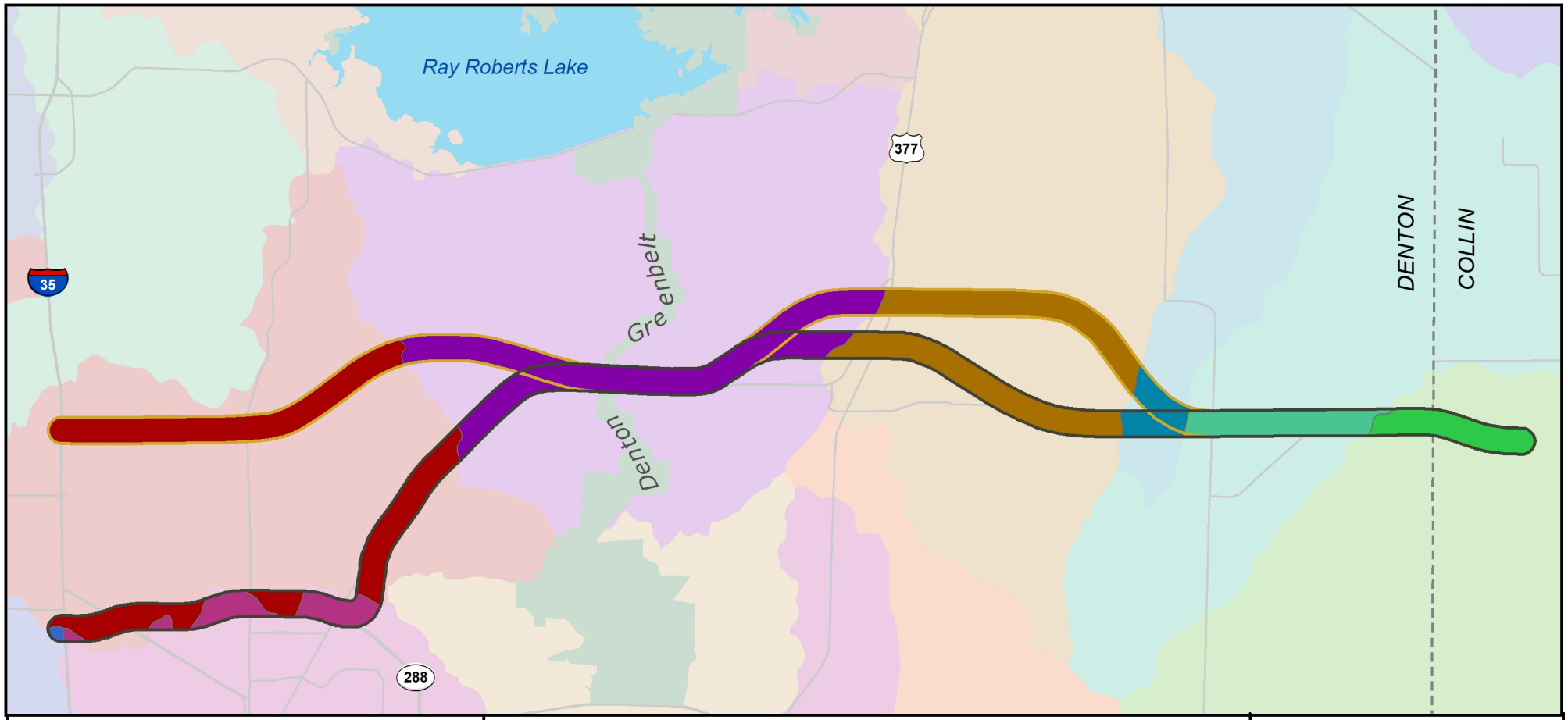
N W E S

North Central Texas Council of Governments

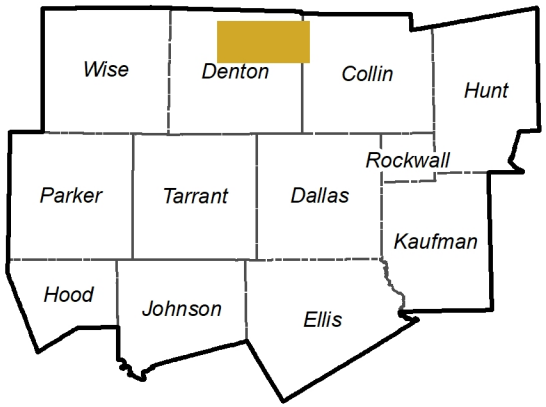
TWDB, 2018

Figure A-21: HUC-12 Subwatersheds

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



Alignment 1
Alignment 2
State Parks
Existing Roads

HUC-12 Subwatersheds

- Culp Branch-Elm Fork Trinity River
- Doe Branch-Little Elm Reservoir
- Milam Creek-Clear Creek
- Mustang Creek
- Pecan Creek
- Pecan Creek-Little Elm Reservoir
- Town of Celina-Little Elm Reservoir
- Upper Hickory Creek

0 1 2 3 Miles

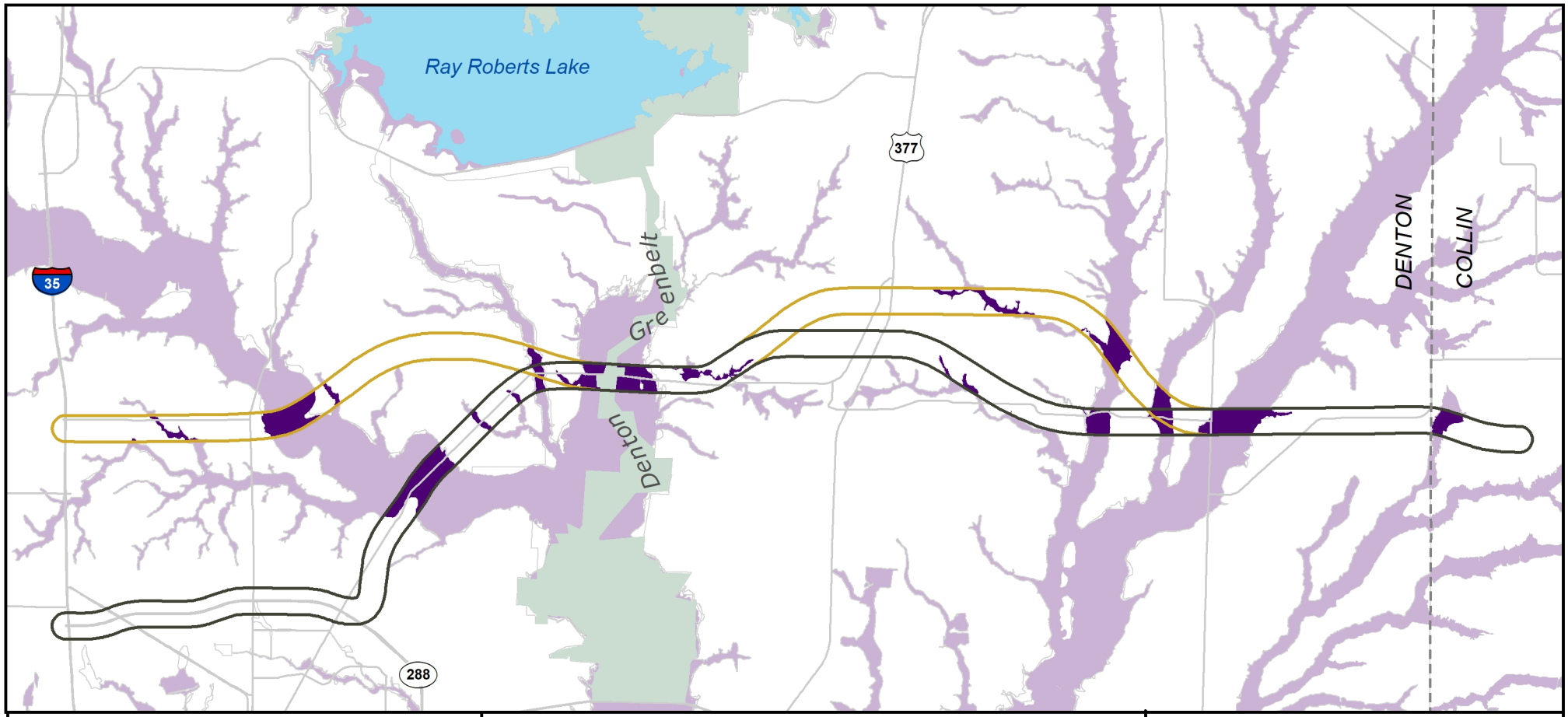
N
W E
S

North Central Texas Council of Governments

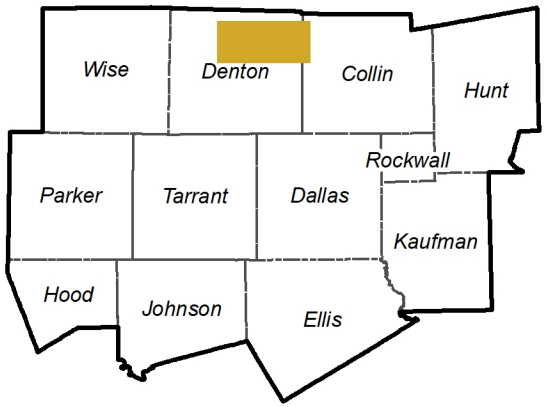
USGS, 2009

Figure A-22: Floodplains

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



- Alignment 1
- Alignment 2
- State Parks
- Existing Roads
- 100 Year Flood Zone

0 1 2 3 Miles

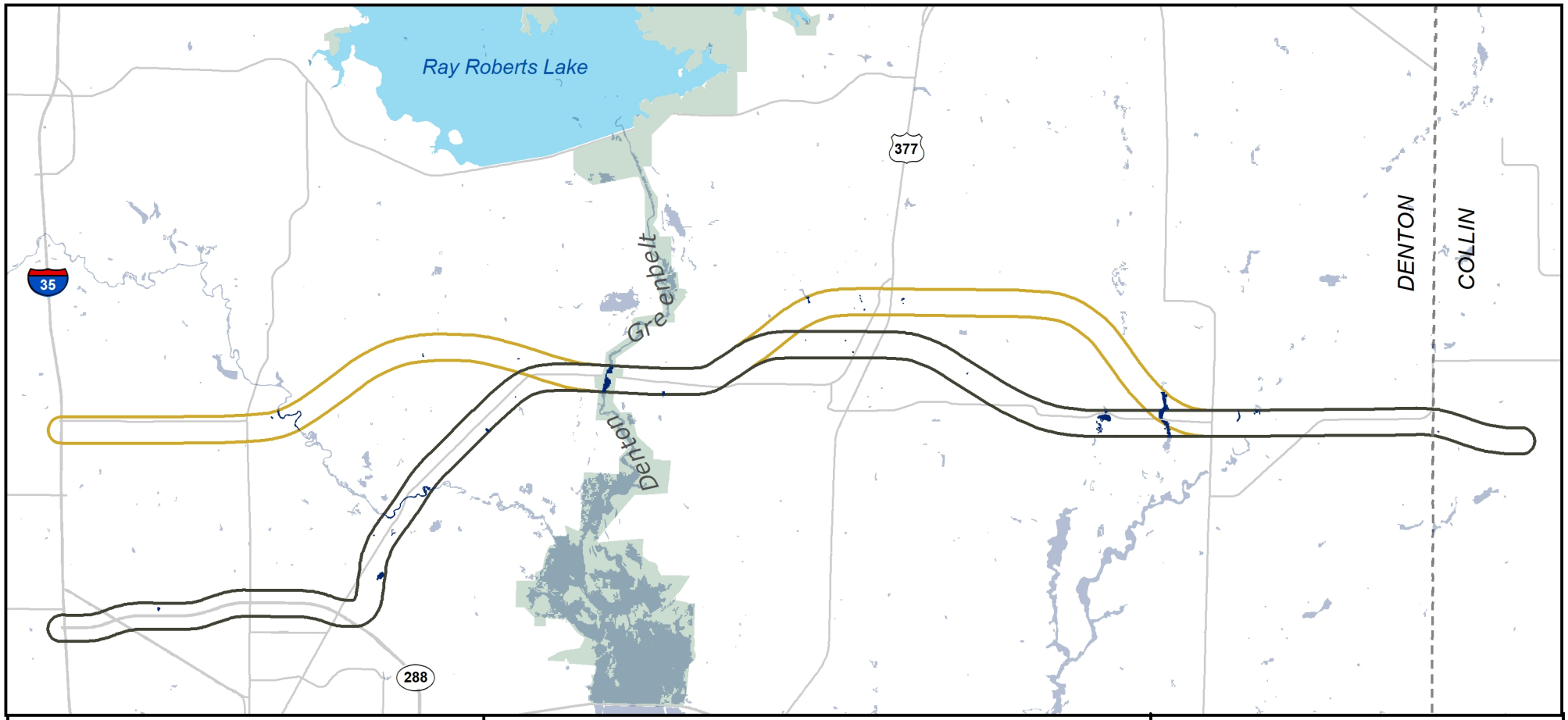
N W E S

North Central Texas Council of Governments

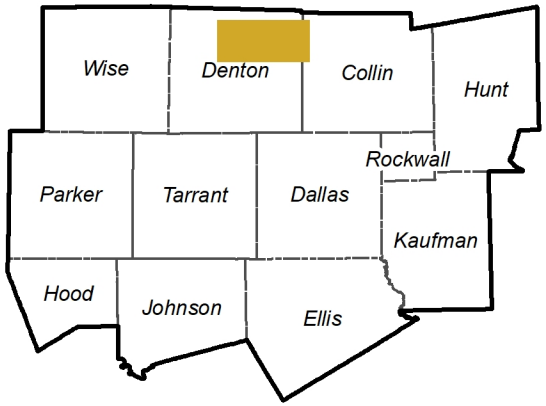
FEMA, 2014

Figure A-23: Wetlands

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



- Alignment 1
- Alignment 2
- State Parks
- Existing Roads
- Wetlands

0 1 2 3 Miles

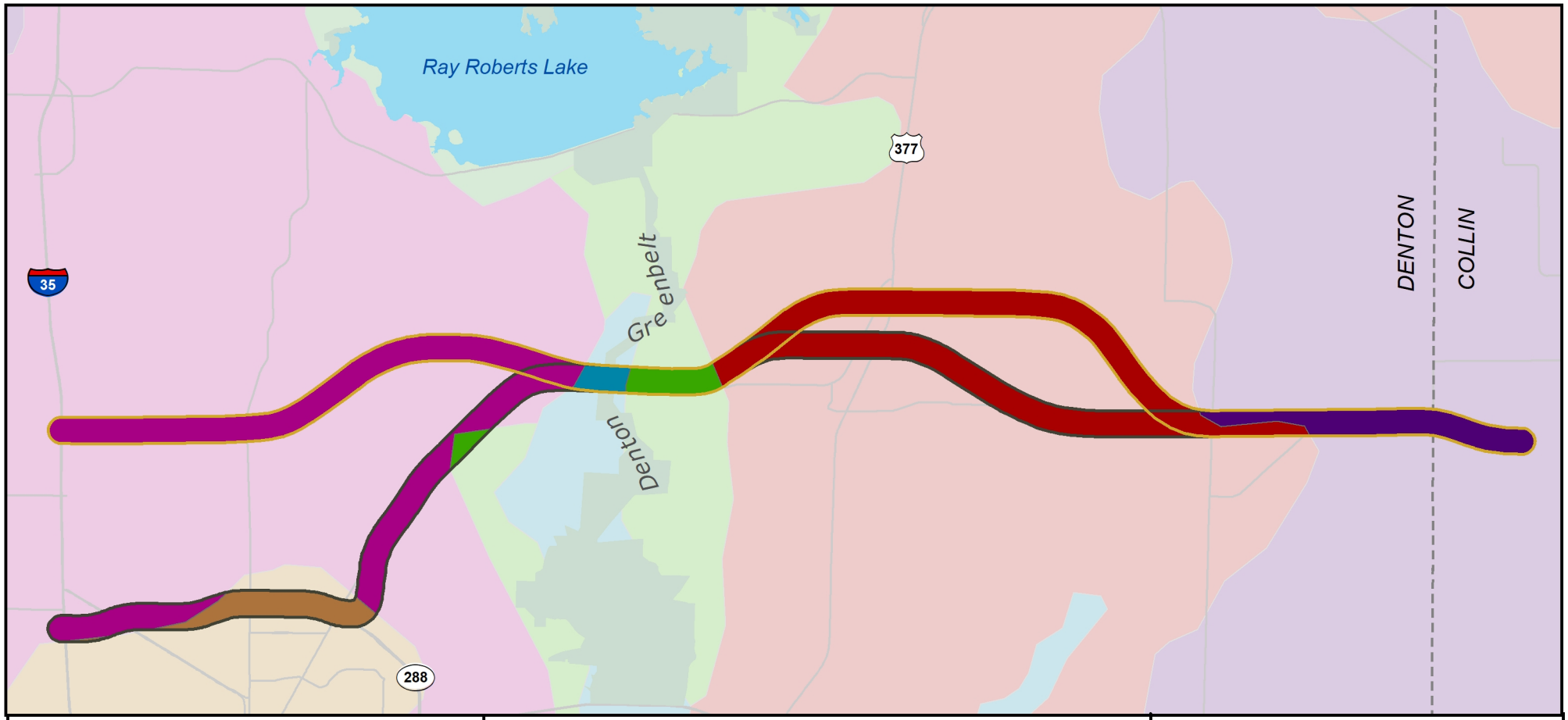
N W E S

North Central Texas Council of Governments

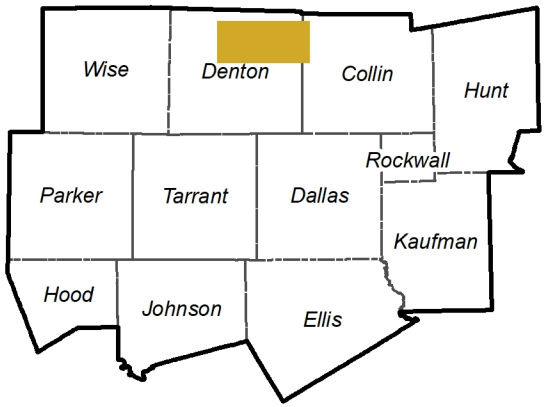
NLCD 2011, NWI 1979, EMST 2009-2014

Figure A-24: Vegetation Types of Texas

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



- Alignment 1
- Alignment 2
- State Parks
- Existing Roads

Vegetation Type

- Crops
- Lewisville Lake
- Other
- Post Oak Woods, Forest, and Grassland Mosaic
- Silver Bluestem-Texas Wintergrass Grassland
- Urban

0 1 2 3 Miles

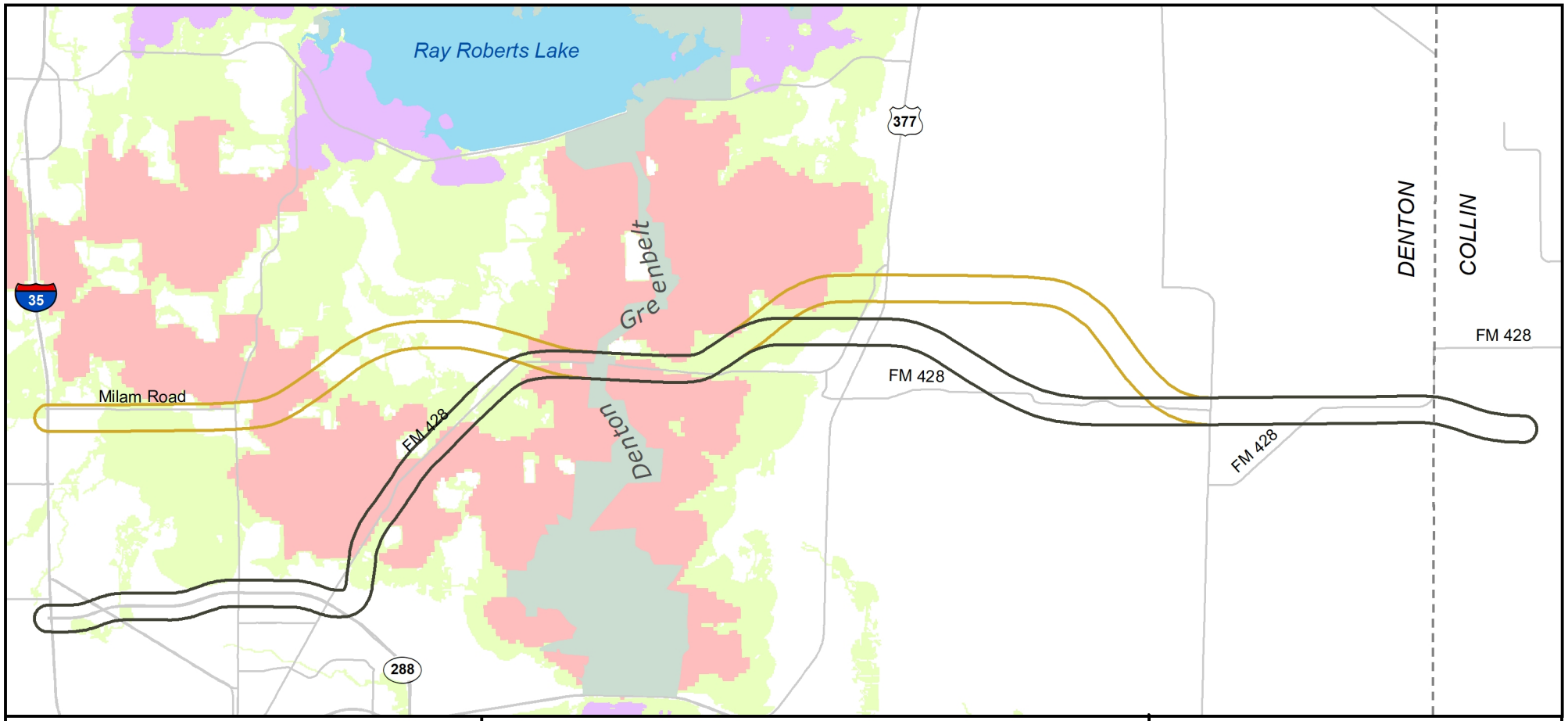
N W E S

North Central Texas Council of Governments

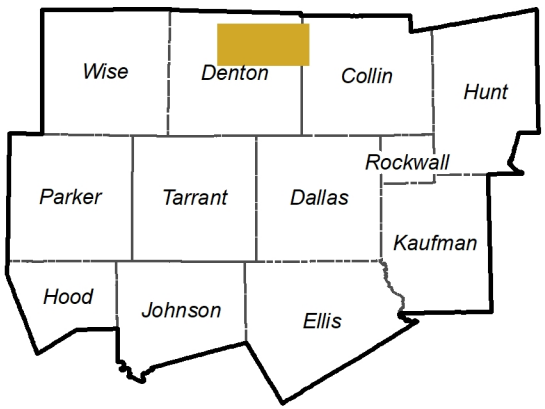
TPWD, 2018

Figure A-25: National Ecological Framework

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



- Alignment 1
- Alignment 2
- State Parks
- Existing Roads

National Ecological Framework

- Background
- Hubs
- Corridors
- Auxiliary Connections

0 1 2 3 Miles

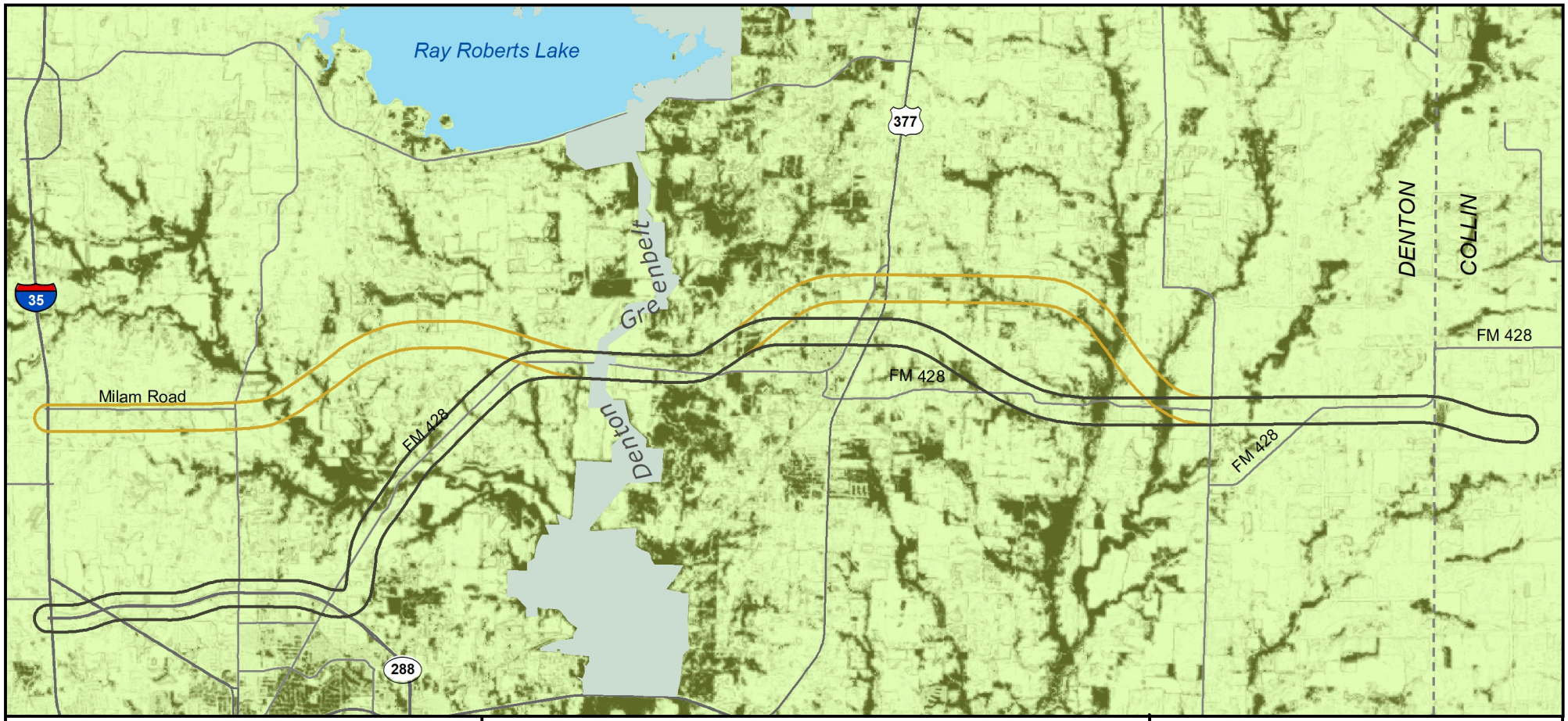
N W E S

North Central Texas Council of Governments

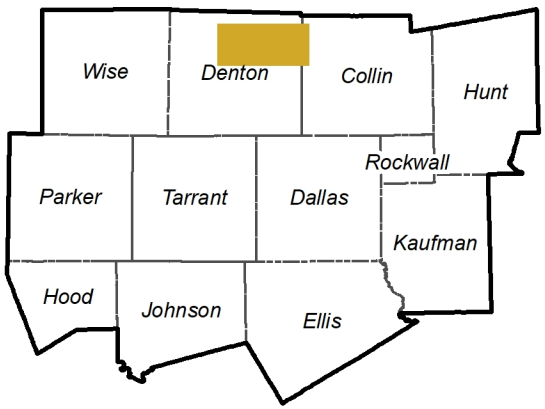
EPA, 2013

Figure A-26: Tree Canopy

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



Alignment 1
Alignment 2
State Parks
Existing Roads

Percent of Tree Canopy

100%

0%

0 1 2 3 Miles

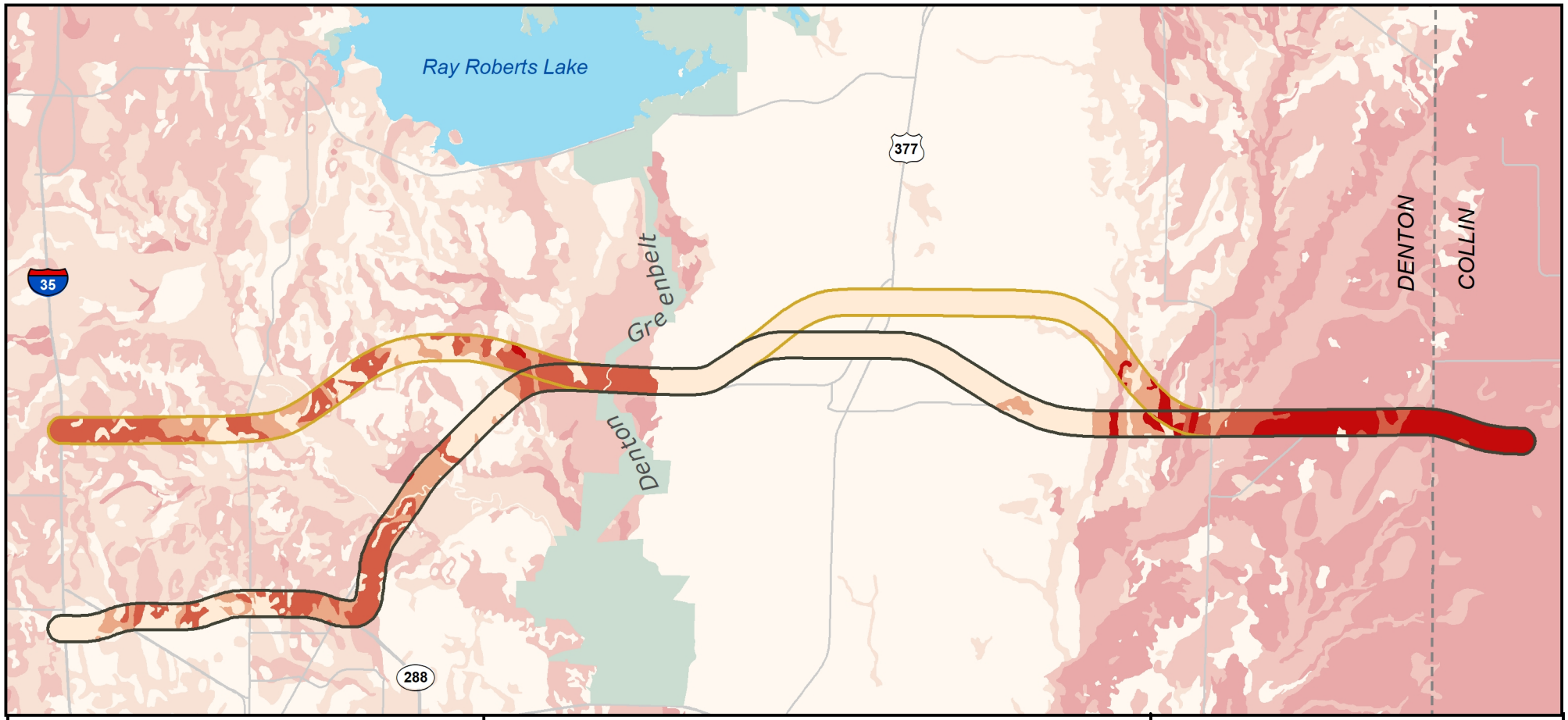
N
W E
S

North Central Texas Council of Governments

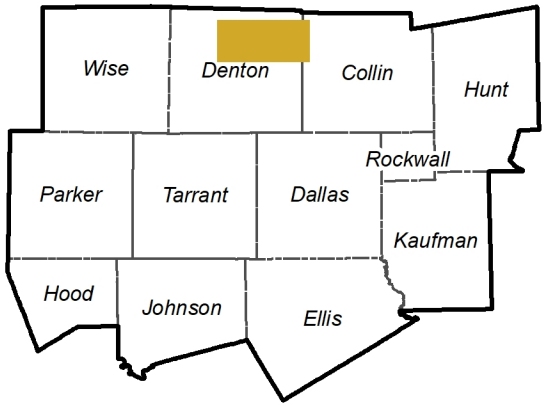
NLCD, 2011

Figure A-27: Shrink-Swell Potential of Soil

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



Alignment 1
Alignment 2
State Parks
Existing Roads

Shrink-Swell Potential

Low
Moderate
High
VeryHigh

0 1 2 3 Miles

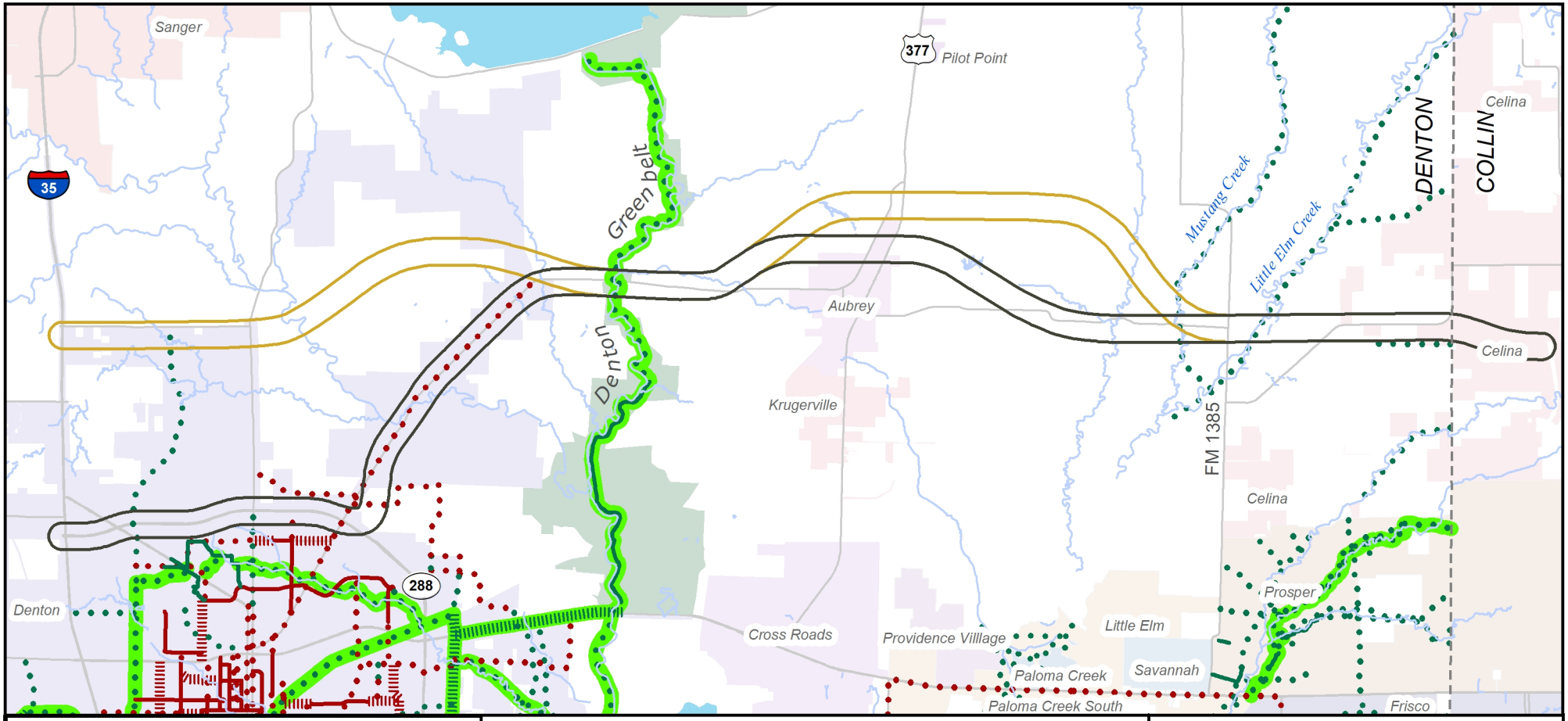
N
W E
S

North Central Texas Council of Governments

NRCS, 2018

Figure A-28: Future Trails

Denton Greenbelt Corridor Feasibility Study



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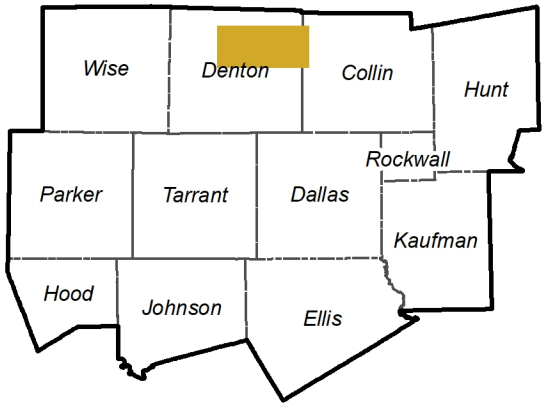

Regional trails

- 2045 Regional Veloweb

Community Shared-Use Paths and Bikeways

- Off-Street, Existing
- Off-Street, Funded
- Off-Street, Planned
- On-Street, Existing
- On-Street, Funded
- On-Street, Planned

- Alignment 1
- Alignment 2
- State Parks
- Existing Roads

0 1 2 3 Miles

N
W E
S

North Central Texas Council of Governments

NCTCOG, 2018

Appendix B – Data Sources

INVEST criteria CS-20 addresses policies related to data used in the Denton Greenbelt Corridor Feasibility Study. The study reflects the best and most recently available data. Data sources, their creation date, and their update frequency are described below. The sources include federal, state, and local data.

Data sourced from the North Central Texas Council of Governments (NCTCOG) is developed in coordination with member jurisdictions. Population and employment forecasts are developed using a control total of households, population, and employment. Land use and urban growth models are applied, and model results are reviewed by local entities to ensure their consistency with local plans. More information on this methodology can be found at http://data-nctcoggis.opendata.arcgis.com/. Spatial data such as features and developments have been collected via surveys and site visits and are updated continuously using data in publications and websites or by direct contact with developers, property managers, or employers. Land use inventories are developed using parcel data, orthophotos, and other sources. Additional information on this methodology also is available at http://data-nctcoggis.opendata.arcgis.com/.

The Dallas-Fort Worth Regional Travel Model for the Extended Area (DFX) is the travel demand model for North Central Texas, providing analytical tools for travel forecasting. DFX is a collection of components that implements a trip-based four-step travel demand model on the TransCAD platform.

DFX accepts the following input files: demographic data, roadway network including toll roads and HOV, transit supply system including rail and park-and-ride, airport enplanements, external stations forecasts, and special generator information. It produces traffic volumes and speeds on roadways and transit usage data on the transit system. In addition to flexible coding tools, a smooth menu system for performing model runs, and extensive reports, the software provides a comprehensive file management system for the organization of input and output data.

The parameters, coefficients, and models in this application are calibrated based on the following data sources:

- 2015 Dallas/Fort Worth International Airport and Dallas Love Field Airport originating passenger surveys
- 2012 Commercial Vehicle Survey
- 2016 External Traffic Study
- 2009 National Household Travel Survey
- 2014 North Central Texas Transit Travel Survey
- 2012 Workplace and Special Generator survey
- 2014 National Performance Management Research Data Set (NPMRDS)
- 2014 traffic counts

The regional travel model has been calibrated to match 2014 observed data. The model is periodically validated based on updated observed data. The official validation occurs every five years; however, small validations usually happen in between. Subarea or corridor analysis frequently provide new data and validation opportunities for the regional model within the five-year interval.

Data Set	Coverage	Type	Source	Created	Updated
2011 National Land Cover Data	NCTCOG Region	Shapefile (Polygon)	US EPA	2011	
American Community Survey	NCTCOG Region	Database/ Table	US Census Bureau	2015	Annually
Cemeteries	State of Texas	Shapefile (Point)	THC	2018	
City Limits	NCTCOG Region	Shapefile (Polygon)	NCTCOG	2017	Annually
County Boundaries	NCTCOG Region	Shapefile (Polygon)	NCTCOG		As Needed
Ecoregions	State of Texas	Shapefile (Polygon)	TPWD	2004	
Features	NCTCOG Region	Shapefile (Point)	NCTCOG	2017	Continuously
Developments	NCTCOG Region	Shapefile (Point)	NCTCOG	2017	Continuously
Flood Zones	Partial NCTCOG Region (Collin, Dallas, Denton, Johnson, Tarrant)	Shapefile (Polygon)	FEMA	2014	
Gas Wells	NCTCOG Region	Shapefile (Point)	RRC	2008	
Highways	NCTCOG Region	Shapefile (Polyline)	NCTCOG	2017	As Needed
Lakes	NCTCOG Region	Shapefile (Polygon)	NHD	2017	
Lakes (Impaired)	NCTCOG Region	Shapefile (Polygon)	TCEQ	2014	
Land Use (2015)	NCTCOG Region	Shapefile (Polygon)	NCTCOG	2015	
Major Employers	NCTCOG Region	Shapefile (Point)	NCTCOG		Continuously
Museums	NCTCOG Region	Shapefile (Point)	THC	2018	
National Register Districts	State of Texas	Shapefile (Polygon)	THC	2018	
National Register Properties	State of Texas	Shapefile (Point)	THC	2018	
National Wetlands Inventory	NCTCOG Region	Shapefile (Polygon)	USFWS	1979	
Natural Diversity Database	NCTCOG Region	Database/ Table	TPWD	2018	
Parcels	Partial NCTCOG Region (Collin, Denton)	Shapefile (Polygon)	County Appraisal Districts	Varies	Annually
Peak-Period Congestion	NCTCOG Region	Shapefile (Polygon)	NCTCOG	2018	

Data Set	Coverage	Type	Source	Created	Updated
Pipelines	NCTCOG Region	Shapefile (Polyline)	RRC	2008	
Population and Population Demographic Forecast	NCTCOG Region	Shapefile (Polygon)	US Census, Texas Water Development Board, 2015	2010, 2015	
Regional Performance Measures	NCTCOG MPA	Table	Mobility 2045	2018	
Roadways	NCTCOG Region	Shapefile (Polyline)	NCTCOG	2017	Annually
School Districts	NCTCOG Region	Shapefile (Polygon)	TEA	2018	
State Historic Sites	State of Texas	Shapefile (Polygon)	THC	2017	
State Parks and Wildlife Management Areas	State of Texas	Shapefile (Polygon)	USGS	2016	
Stormwater Assets	City of Denton; Denton County	Online Viewer; Shapefile (Point)	City of Denton; Denton County		
Soils	NCTCOG Region (Collin, Denton)	Shapefile (Polygon)	NRCS	2018	
Soils - Prime Farmland	NCTCOG Region	Shapefile (Polygon)	NCRS	2018	
Streams	NCTCOG Region	Shapefile (Polyline)	NHD	2016	As Needed
Streams (Impaired)	NCTCOG Region	Shapefile (Polyline)	TCEQ	2014	
Superfund Sites	State of Texas	Shapefile (Point)	TCEQ	2017	
Threatened and Endangered List	NCTCOG Region	Database/ Table	TPWD		Continuously
Threatened and Endangered List	NCTCOG Region	Database/ Table	USFWS		Continuously
Transportation Improvement Program	NCTCOG MPA	Shapefile (Point) Shapefile (Polyline) Shapefile (Polygon)	NCTCOG	2018	Continuously
US Census	NCTCOG Region	Database/ Table	US Census	1990, 2000, 2010	Decennially
Vegetation Types of Texas	NCTCOG Region	Shapefile (Polygon)	TPWD	1984	

Appendix C – Acronyms

Acronym	Definition
AAI	All Appropriate Inquiries
ACT	Antiquities Code of Texas
ACS	American Community Survey
BEG	Bureau of Economic Geology
BMP	Best Management Practices
CAA	Clean Air Act
CAAA	Clean Air Act Amendments of 1990
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CMP	Congestion Management Process
CO	Carbon Monoxide
CS	(INVEST) Corridor Study
CWA	Clean Water Act
DCTA	Denton County Transportation Authority
DFIRM	Digital Flood Insurance Rate Map
DFX	Dallas-Fort Worth Regional Travel Model for the Extended Area
DNT	Dallas North Tollway
DOI	Department of the Interior
EMST	Ecological Mapping Systems of Texas
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FM	Farm-to-Market
GIS	Geographic Information System
HOV	High Occupancy Vehicle
HVA	Hazard Vulnerability Analysis
IH	Interstate Highway
INVEST	Infrastructure Voluntary Evaluation Sustainability Tool
ITS	Intelligent Transportation Systems
LEP	Limited English Proficiency
LWCF	Land and Water Conservation Fund Act
MPA	Metropolitan Planning Area
MPO	Metropolitan Planning Organization
MTP	Metropolitan Transportation Plan
MSAT	Mobile Source Air Toxics

MS4	Municipal Separate Storm Sewer System
NAAQS	National Ambient Air Quality Standards
NCTCOG	North Central Texas Council of Governments
NDD	(TPWD) Natural Diversity Database
NEF	(EPA) National Ecological Framework
NEPA	National Environmental Policy Act of 1969
NFIP	National Flood Insurance Program
NHD	National Hydrography Dataset
NHPA	National Historic Preservation Act
NLCD	National Land Cover Database
NOI	Notice of Intent
NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxides
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OSHM	Official State Historical Markers
Pb	Lead
PEL	Planning and Environment Linkages
PM	Particulate Matter
PPB	Parts Per Billion
PPM	Parts Per Million
RRC	Railroad Commission of Texas
REC	Recognized Environmental Condition
RCRA	Resource Conservation and Recovery Act
RTHL	Recorded Texas Historic Landmark
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SAL	State Archeological Landmark
SH	State Highway
SIP	State Implementation Plan
SOV	Single Occupant Vehicles
SO2	Sulfur Dioxide
STIP	State Transportation Improvement Program
SWPPP	Storm Water Pollution Prevention Plan
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
THC	Texas Historical Commission
THTP	Texas Heritage Trails Program
TIP	Transportation Improvement Program
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department
TWDB	Texas Water Development Board
TxDOT	Texas Department of Transportation

US	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
USFWS	US Fish and Wildlife Service
USGS	United States Geological Survey
VMT	Vehicles Miles Traveled

Appendix D – Bibliography

CHAPTER 1

Section 1.0 Introduction

FHWA. n.d. Infrastructure Voluntary Evaluation Sustainability Tool (INVEST). http://www.sustainablehighways.org/

NCTCOG. 2007. *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area*.

NCTCOG. 2018. *Mobility 2045: The Metropolitan Transportation Plan for North Central Texas*. https://www.nctcog.org/trans/plan/mtp/2045

Section 1.1 The Planning Process

NCTCOG. 2011. Regional Outer Loop Corridor Feasibility Study.

Section 1.2 Regional Planning Context

NCTCOG. 2009. *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area, 2009 Amendment*.

NCTCOG. 2011. *Mobility 2035: The Metropolitan Transportation Plan for North Central Texas*.

NCTCOG. 2016. *Mobility 2040: The Metropolitan Transportation Plan for North Central Texas*.

NCTCOG. 2018. *Mobility 2045: The Metropolitan Transportation Plan for North Central Texas*. https://www.nctcog.org/trans/plan/mtp/2045

Section 1.3 Study Context and Previous Studies

NCTCOG. 2011. Regional Outer Loop Corridor Feasibility Study.

Section 1.4. Denton County

Denton County. 2017. Denton County Thoroughfare Plan. https://dentoncounty.com/Pages/Thoroughfare-Plan.aspx

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Appendix E – What is INVEST?

The North Central Texas Council of Governments (NCTCOG) used the Infrastructure Voluntary Evaluation Sustainability Tool (INVEST) to identify sustainability best practices in this feasibility study of the Denton County Outer Loop/Greenbelt Parkway. This work was conducted using grant funds from the Federal Highway Administration, which developed INVEST.

The sustainability best practices are identified as criteria used to score plans or programs. The criteria focus on practices "above and beyond" those required for programs and projects receiving federal funds. The tool's purpose is to improve social, economic, and environmental outcomes.

Federal Highway Administration-developed INVEST criteria apply to system planning, project development, and operations and maintenance. NCTCOG modified the tool's criteria to apply to a corridor-scale study. Appropriate criteria were then integrated into this feasibility study. All corridor-scale criteria developed by NCTCOG are included Table E-1.

The Denton Greenbelt Corridor was identified by NCTCOG as a good candidate for INVEST because the roadway travels through a conserved greenbelt that is part of the most widely visited state park in Texas. Ray Roberts State Park provides access to hiking, biking, equestrian, and paddling trails and is a wildlife corridor between two lakes. The lakes provide drinking water to the cities of Dallas, Denton, and neighboring communities. The right-of-way of the existing road is flanked by a historic bridge and conservation easements.

More information on INVEST can be found at https://www.sustainablehighways.org/.

Table E-1. Draft Feasibility Study Sustainability Menu

Criteria		Corridor Applicability			
		All	**Natural or Scenic**	**EJ Communities**	**Smaller-Scale Facility**
CS-01 Economic Development and Land Use	**CS-01.1** In purpose and need, identify how the transportation need can meet economic development and land use planning.	✓			
	CS-01.2 As applicable, engage land use and economic development agencies via stakeholder meetings and agency working groups while developing the study.	✓			
	CS-01.3 Analyze and compare how alignments overlay with land uses, in terms of acreage of each land use. Use standardized width for transportation features.	✓			
	CS-01.4 Consider existing comprehensive plans and thoroughfare plans when analyzing alignments.	✓			
	CS-01.5 Consider expanding or modifying existing facilities instead of creating new facilities, if appropriate.	✓			
CS-02 Natural Environment	**CS-02.1** For alignments that may be located in or near environmentally sensitive areas, engage natural resource and regulatory agencies via NCTCOG's Planning and Environment Linkages stakeholder group.		✓		
	CS-02.2 Quantify the overlay of alignments and aquatic resources.	✓			
	CS-02.3 Quantify the overlay of alignments with hubs, corridors, and auxiliary areas in the Environmental Protection Agency's National Ecological Framework.		✓		
	CS-02.4 Identify which alignments may require a site-specific ecological assessment to be conducted during studies under the National Environmental Policy Act.		✓		

Criteria		Corridor Applicability			
		All	**Natural or Scenic**	**EJ Communities**	**Smaller-Scale Facility**
CS-03 Scenic, Natural, or Recreational Qualities	**CS-03.1** As applicable, identify whether alignments maintain existing access to scenic, natural, or recreational qualities.	✓			
	CS-03.2 As applicable, identify whether alignments overlay scenic, natural, or recreational qualities.	✓			
CS-04 Historical, Archaeological, and Cultural Preservation	**CS-04.1** As applicable, identify whether alignments overlay historic cemeteries, National Register Districts, National Register Properties, modeled or surveyed archeological sites, or parcels with buildings age 50 or older.	✓			
	CS-04.2 If applicable, identify whether alignments overlay a State Scenic Trail or route designated or officially recognized as significantly historical, cultural, or archaeological.	✓			
	CS-04.3 Engage community stakeholders to assist in identifying whether any part of the project or corridor is recognized by the community as having historic, cultural, and/or archeological significance to the community.	✓			
CS-05 Light Pollution	**CS-05.1** Identify which alignments overlay areas that may be negatively affected by light pollution, including uplighting, backlighting, and glare.	✓			

Criteria		Corridor Applicability			
		All	**Natural or Scenic**	**EJ Communities**	**Smaller-Scale Facility**
CS-06 Social Considerations	**CS-06.1** Engage community stakeholders to identify the community's vision for sustainability in the corridor.	✓			
	CS-06.2 Engage a diverse range of stakeholders and public participants that includes, at a minimum, all interested parties, in addition to all other parties potentially affected by changes to the transportation system.	✓			
	CS-06.3 Where environmental justice, Title VI, and transportation-disadvantaged groups are affected, use a diverse and innovative range of public involvement techniques to ensure the engagement process is inclusive.			✓	
	CS-06.4 During stakeholder and public meetings, provide education about the transportation planning process and how public input can improve the process.	✓			
	CS-06.5 Promote and educate the public about environmental, social, or economic sustainability as appropriate to the corridor by developing a project website, creating a stakeholder guide, or giving presentations.	✓			
	CS-06.6 Use a transparent process to inform stakeholders how their input will be used and follow through accordingly.	✓			
	CS-06.7 Demonstrate to stakeholders how their input was used to inform and affect transportation planning decisions and document the input's impact in the feasibility study.	✓			
CS-07 Context Sensitive Solutions	**CS-07.1** As applicable, identify alignments where needs for context sensitive solutions should be addressed during the National Environmental Policy Act process.		✓	✓	✓
	CS-07.2 Include multimodal, multijurisdictional, and multidisciplinary members on the feasibility study team.	✓			
	CS-07.3 Engage external "champions" for the project in the affected community to support the project.		✓	✓	✓
	CS-07.4 Seek acceptance among project stakeholders on the problems, opportunities, and needs that the project should address and the resulting vision or goals for addressing them.	✓			

Criteria		Corridor Applicability			
		All	**Natural or Scenic**	**EJ Communities**	**Smaller-Scale Facility**
CS-08 Access and Affordability	**CS-08.1** Where applicable, analyze the equity of physical access for the corridors.			✓	
	CS-08.2 Where applicable, for projects with a tolled component, identify specific populations or areas where affordability may be an issue, including what portion of a low-income household's income may be spent on tolls if the facility is constructed.			✓	
	CS-08.3 Where applicable, document targeted, enhanced outreach, or communication that has been used to engage populations or areas where affordability may be an issue.			✓	
CS-09 Safety	**CS-09.1** Address applicable emphasis areas and strategies in the State Strategic Highway Safety Plan listed below. • Increase the installation of engineering countermeasures known to reduce distracted driving • Use technology to reduce distracted driving crashes, serious injuries, and fatalities • Improve mobility options for impaired road users • Consider alternative design strategies for improving intersection safety • Improve pedestrian safety at intersections with high probability of crashes • Increase driver awareness of intersections • Design and operate roadways to meet the needs of older road users • Reduce bicycle/pedestrian crashes on urban arterials and local roadways • Improve bicyclists'/pedestrians' visibility at crossing locations • Improve bicycle/pedestrian networks • Improve bicycle/pedestrian involved crash reporting • Keep vehicles from encroaching on the roadside or opposite lane • Minimize the consequences of vehicles leaving the road • Minimize the likelihood of crashing in adverse conditions • Use the concept of establishing a target speed limit and road characteristics to reduce speeding	✓			

Criteria		Corridor Applicability			
		All	Natural or Scenic	EJ Communities	Smaller-Scale Facility
	CS-09.2 Address safety concerns in the corridor as identified by the long-range plan or 10-year plan.	✓			
	CS-09.3 Identify potential contributing factors to crashes (on existing facilities that are included in the study) and identify the need to build awareness among the public.	✓			
	CS-09.4 Include explicit consideration of safety using quantitative methods for each alternative.	✓			
CS-10 Multimodal Transportation and Health	CS-10.1 Compare the alignments' opportunity to enhance the extent and connectivity of multimodal infrastructure, including bicycle and pedestrian connectivity.				✓
	CS-10.2 Engage public health and active-mode stakeholders.				✓
	CS-10.3 Identify opportunities to integrate transit, pedestrian, bicycle, and roadway modes.		✓		✓
	CS-10.4 Identify how chosen alignment/s promote public health through improving congestion, safety, and opportunities for active transportation.	✓			
	CS-10.5 Where applicable, identify the need for sidewalks to allow pedestrian connections to Veloweb access points.		✓		✓
CS-11 Transit Facilities	CS-11.1 Identify the need, purpose, and appropriateness for transit access within the project footprint.	✓			

Criteria		Corridor Applicability			
		All	Natural or Scenic	EJ Communities	Smaller-Scale Facility
CS-12 Freight and Goods Access and Mobility	CS-12.1 In corridors where freight is applicable, identify opportunities for maintaining and improving freight reliability and connectivity between modes and to freight generators for both inter- and intra-city freight.	✓			
	CS-12.2 If the alignments are near freight facilities, consider multimodal freight mobility needs, such as intermodal facilities and the siting of freight facilities.	✓			
	CS-12.3 If applicable, utilize the Regional Freight Advisory Committee to engage stakeholders, including freight service providers, workers, representatives, and neighbors that surround freight facilities.	✓			
	CS-12.4 Assess freight accessibility and mobility, such as freight movements, turning radius, adequate capacity or restricted capacity, and land use ordinances that minimize freight effects on the surrounding areas.	✓			
	CS-12.5 If applicable, assess freight reliability by identifying opportunities for infrastructure that supports supply chain movements, including truck parking with amenities for drivers and the corridor's capacity for safe and efficient movement of freight.	✓			
CS-13 Travel Demand Management	CS-13.1 Identify strategies to reduce trips during peak periods and demonstrate that strategies cannot reduce demand enough to eliminate the need for the alignment.	✓			
	CS-13.2 Analyze effectiveness of strategies to improve parallel facilities in lieu of building the new facility.	✓			

Criteria		Corridor Applicability			
		All	Natural or Scenic	EJ Communities	Smaller-Scale Facility
CS-14 Air Quality and Emissions	CS-14.1 Identify alignments where temporary construction impacts and long-term impacts may affect air quality.	✓			
	CS-14.2 Engage air quality stakeholders, including the Texas Commission on Environmental Quality and the Environmental Protection Agency.	✓			
	CS-14.3 Identify alignments' ability to reduce congestion, including on parallel and connecting facilities.	✓			
	CS-14.4 If the facility is on or connects within 5 miles of an Energy Corridor, identify locations and/or density of electric vehicle charging stations and identify the need for charging stations on alignments.	✓			
CS-15 Optimizing Assets	CS-15.1 Identify opportunities to maximize existing transportation system capacity (including bridges) before considering major capital infrastructure investment, in keeping with policy in the long-range transportation plan. These opportunities include minor-, medium-, and major-scale improvements.	✓			
	CS-15.2 Where partner agencies maintain asset management data and economic analysis, incorporate this information into the feasibility study process.	✓			
	CS-15.3 Conduct a high-level analysis of how alignments may utilize current stormwater assets.	✓			
	CS-15.4 Compare alignments' travel time savings.	✓			
CS-16 Operational Efficiency	CS-16.1 Identify strategies to increase efficiency via other modes or alternatives to single occupant vehicles.	✓			
	CS-16.2 Conduct post-process calculations for the No-Build scenario and alignments to identify benefits of Transportation System Management & Operations strategies identified in the long-range transportation plan.	✓			
	CS-16.3 Compare alignments' access to fiber networks or other sufficient infrastructure for connected automated vehicles.	✓			

Criteria		Corridor Applicability			
		All	Natural or Scenic	EJ Communities	Smaller-Scale Facility
CS-17 Infrastructure Resiliency	CS-17.1 Compare alignments' susceptibility or impact to environmental factors related to extreme weather, including reduction in local tree canopy, shrink-swell potential for soils, low-water crossings, flooding potential greater than that documented by the Federal Emergency Management Agency to account for increasing impervious surfaces, and vulnerability to large water releases from dams.	✓			
	CS-17.2 Determine how alignments are compatible with the hazard mitigation plans of state and local agencies and jurisdictions.	✓			
	CS-17.3 Engage stakeholders associated with hazard mitigation, including the US Army Corps of Engineers, Texas Water Development Board, Texas Commission on Environmental Quality, Environmental Protection Agency, counties, and local officials.	✓			
CS-18 Earthwork Balance	CS-18.1 Identify the profile (preliminary engineering schematic) and terrain of alignments to incorporate grade into feasibility considerations.	✓			
CS-19 Linking Planning and NEPA	CS-19.1 Implement Planning and Environment Linkages best practices, including: • National Environmental Policy Act tiering • Purpose and need statements • Scoping and alternatives identification • Analysis or baselining of environmental condition • Evaluation and/or elimination of alternatives • Multimodal analysis • Context sensitive design considerations • Indirect and cumulative impacts assessment • Preparatory analyses for permitting	✓			

Criteria		Corridor Applicability			
		All	Natural or Scenic	EJ Communities	Smaller-Scale Facility
	CS-19.2 Structure the document in a format compatible with the National Environmental Policy Act.	✓			
	CS-19.3 Summarize National Environmental Policy Act-related content in the introduction and/or recommendations.	✓			
	CS-19.4 Consult National Environmental Policy Act practitioners during the study.	✓			
CS-20 Analysis Methods	CS-20 Describe the agency's policies related the following as they apply to data used in the study: • Quality control • Frequency of updates • Adequate funding	✓			

Appendix F – Agency and Stakeholder Involvement

INVEST Denton County Outer Loop/ Greenbelt Parkway Communications Plan

Project Overview

The Metropolitan Transportation Plan currently includes a recommendation to add a new east-west highway facility in Denton County between I-35 and a planned extension of the Dallas North Tollway. Demand for the Denton County Outer Loop is based on population and economic growth projections for 2040. A Planning and Environment Linkages (PEL) study is assessing the transportation needs in this corridor to identify preliminary alternatives and preliminary environmental impacts of the alternatives.

The study corridor crosses the Denton Greenbelt; the Greenbelt is part of Ray Roberts Lake State Park, the second-most visited state park in Texas. Operated by the Texas Parks & Wildlife Department, the Greenbelt runs north-south between Lake Ray Roberts and Lewisville Lake. Due to the environmental and ecological value of the corridor, the North Central Texas Council of Governments is using the Federal Highway Administration's INVEST tool to identify and incorporate sustainability and environmental stewardship best practices into the Denton County Outer Loop PEL study. The local community participates in the stewardship of the park through the Greenbelt Alliance and Lake Ray Roberts Equestrian Trail Association (LRRETA); these groups will be included as stakeholders during the project.

This plan outlines goals, target audiences and tactics for outreach to encourage awareness, participation and cooperation with Denton County stakeholders.

Communication and Outreach Goals

- Engage stakeholders from nonprofit organizations, natural resource agencies and municipalities to integrate their feedback into plans for a future roadway
- Encourage discussion to help identify and prioritize strategies to mitigate possible impacts
- Provide the public with an opportunity to give general feedback on plans for the corridor
- Involve nearby landowners, hikers, bicyclists, equestrians and other trail users in the planning process

Target Audiences

- General public in northern Denton County
- Nearby landowners and homeowners
- Hikers, bicyclists, equestrians and other trail users
- Greenbelt Alliance and LRRETA
- Municipalities and government agencies, including the Texas Parks & Wildlife Department, US Army Corps of Engineers and Upper Trinity Regional Water District

INVEST Denton County Outer Loop/Greenbelt Parkway Outreach Plan

Outreach Tactics

Web Strategies and Content | Information about INVEST and the Denton County Outer Loop is online at the NCTCOG Transportation Department website at www.nctcog.org/REF. This web address should be highlighted on all outreach materials. The webpage content includes a link to the 2011 Regional Outer Loop Feasibility Study Report, which will be scored with the INVEST tool to produce sustainability recommendations for the PEL study. The webpage should be updated periodically with links to any newsletters produced for the INVEST study. A banner for the Transportation homepage could link to the INVEST webpage.

> ***Estimated staff time:*** *0.25 - 2 hours per website update; estimate no more than 3 updates*

Print and electronic newsletters, fact sheets, infographics and information pieces | The North Central Texas Council of Governments Transportation Department periodically publishes print and electronic newsletters. Campaign-specific information could include fact sheets, brochures, infographics and posters.

Any publications created for the campaign should be shared with municipalities, government agencies and nonprofit organizations actively involved in the planning process. In addition, staff could occasionally provide short update articles for these groups to publish and share across their own media platforms.

> ***Estimated staff time:*** *10 hours for a new fact sheet or newsletter; 2-3 hours for a revision to an existing fact sheet or newsletter; 1-2 hours for an article*

Community Events | The NCTCOG Transportation Department participates in community events throughout the year to provide information directly to the public in an informal setting. Information about the INVEST project for the Denton Greenbelt could be provided alongside information about other transportation programs and projects at events in Denton and the surrounding areas. In previous years, the Greenbelt Alliance hosted a festival on the Greenbelt, but plans for this year's event have been canceled. The Aubrey Peanut Festival, planned for Saturday, Oct. 7, will provide another opportunity to have a strong presence at a community event in the study corridor.

> ***Estimated staff time:*** *4-6 hours to plan and prepare for each event, plus additional time if an activity must be planned; 3-8 hours per staff member at each event, not including travel time*

Stakeholder Meetings | Meetings to engage key nonprofit organizations, municipalities and government agencies will occur every three to six months, as dictated by project needs and the availability of new information to present. Stakeholder meetings will take place in the study corridor and could include tours of the Greenbelt and other notable areas. Communications staff

will provide presentation review and assistance as needed and take notes during meetings to be provided to the project manager. A tentative schedule for meetings is outlined below:

- June 2017
- December 2017
- Spring 2018
- Summer 2018

Estimated staff time: *12-14 hours to plan, prepare and attend each stakeholder meeting.*

Target Audience Relations | Should additional direct outreach be needed, staff would identify community leaders or groups and reach out directly with more information. Examples of groups or organizations are listed below, as well as possible points of distribution for information.

- Nonprofit organizations, including the Greenbelt Alliance and LRRETA
- Libraries and other civic or community centers
- Religious organizations
- Schools
- Neighborhood associations
- Grocery stores, restaurants, feed stores

Estimated staff time: *10-15 hours for content development; 4-6 hours to distribute content; 8 hours to post flyers or deliver fact sheets or brochures; 1-3 hours for a presentation or meeting*

Evaluation

The campaign will be evaluated periodically to assess the effectiveness of tactics and monitor progress meeting communications and outreach goals. Meeting participation rates, public comments and other quantitative data will be used in the evaluation.

Schedule

A fact sheet providing a general overview of the background and goals of the study will be made available. Staff will attend the Aubrey Peanut Festival on Saturday, Oct. 7. After each stakeholder meeting, the project manager will assess whether additional outreach beyond what is included in the communications plan is required. If necessary, the Public Involvement & Government Relations team will develop a plan for additional outreach; the Transportation Marketing team can also be involved if advertising is needed. Findings and recommendations developed with INVEST will be presented at the final stakeholder meeting in summer 2018. The campaign will end in fall 2018 when stakeholders are provided a link to the final PEL study.

Denton County Outer Loop/Greenbelt Parkway

North Central Texas Council of Governments
Texas Parks & Wildlife Department
US Army Corps of Engineers

August 2, 2017

North Central Texas
Council of Governments

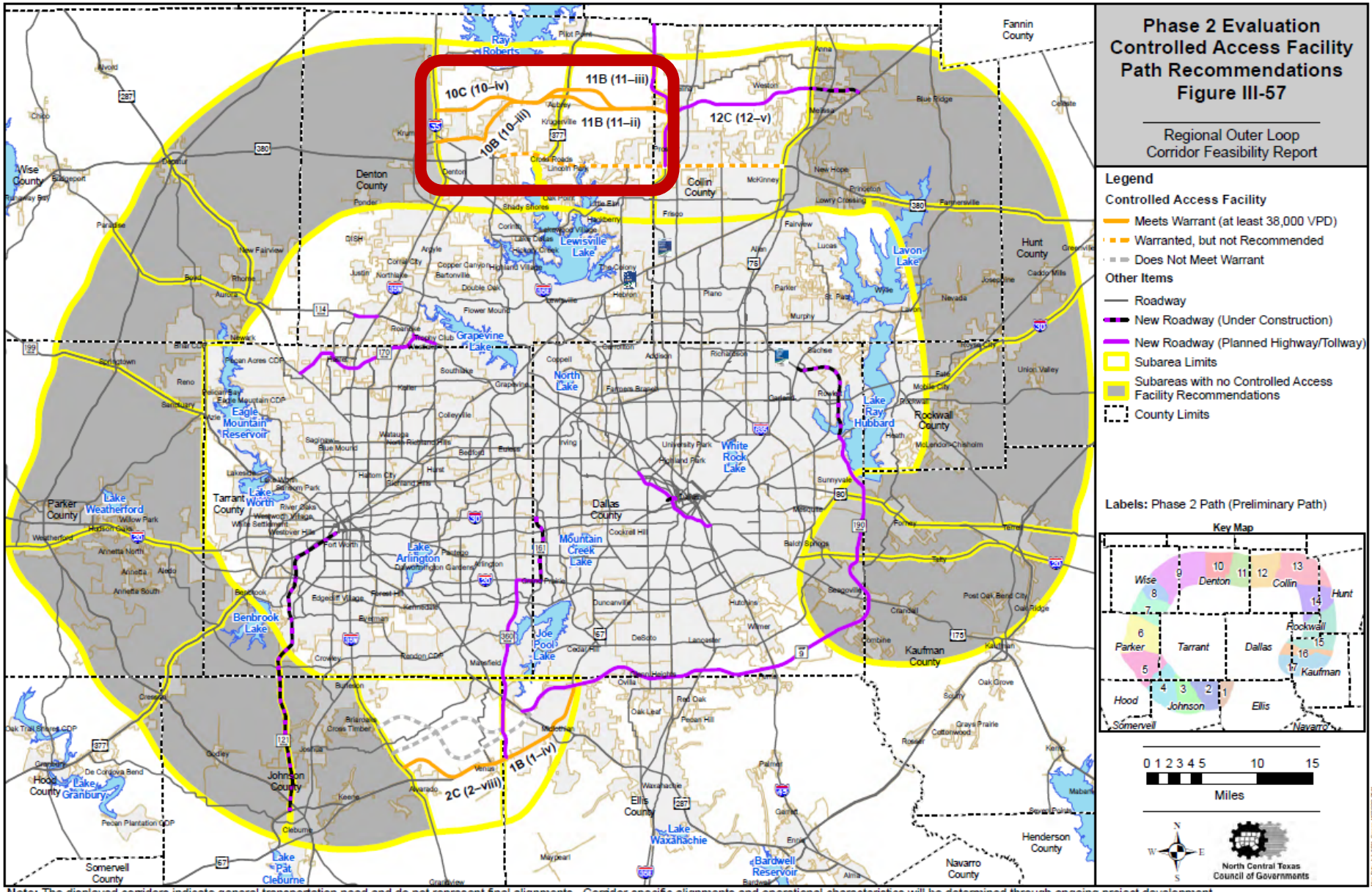
Contents

- Regional Outer Loop History
- Feasibility Study for Denton County Outer Loop
- Deed for FM 428
- Agency Priorities
- Next Steps

REGIONAL OUTER LOOP HISTORY

2011 Feasibility Study

- Regional Outer Loop
- Continuous loop not warranted
- Denton County portion warranted further study
- Population and employment growth
- ≥ 40,000 vehicles per day projected



Note: The displayed corridors indicate general transportation need and do not represent final alignments. Corridor-specific alignments and operational characteristics will be determined through ongoing project development. No third party is authorized to rely on this map for development, construction, bidding, or permit purposes.

2011 Meeting with USACE, TPWD

TPWD feedback/written comment:

- Alignment should be restricted to existing east-west corridor through Greenbelt
- Include TPWD, USACE in future planning
- Avoid, minimize impacts in Greenbelt on habitat, wildlife, park visitation, and use
- Integrate into early planning process mitigation opportunities and costs to offset impacts

Mobility 2040

- Current long-range transportation plan for North Central Texas
- Recommendations for Denton County Outer Loop
  - IH 35 to Dallas North Tollway
  - 2027: 2 continuous frontage lanes
  - 2037: 6 continuous frontage lanes
  - 2040: 6 freeway lanes and 6 continuous frontage lanes
- Mobility 2045 under development

FEASIBILITY STUDY
FOR DENTON COUNTY OUTER LOOP

PEL Study for Denton County Outer Loop

- Planning and Environment Linkages feasibility study
- East-west corridor in eastern Denton County
- Transportation need, alignments
- Environmental data
- Sustainability recommendations – FHWA grant and stakeholder input

DEED FOR FM 428

Deed/Right of Way for FM 428

Confirm 150-foot right of way?

AGENCY PRIORITIES

USACE Priorities

Input from USACE

TPWD Priorities

Input from TPWD

NCTCOG PRIORITIES

- Applicable legislated goals:
  - Safety
  - Congestion reduction
  - System reliability
  - Environmental sustainability
- Applicable Mobility 2040 goals:
  - Mobility
  - Quality of life
    - Preserve, enhance natural environment
    - Promote active lifestyles

Next Steps

Input from all agencies

Contact Information

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817-695-9263

Kate Zielke – Sustainability Recommendations

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817-608-2395

MEETING SUMMARY

Denton County Outer Loop Regulatory Agency Stakeholder Meeting
US Army Corps of Engineers Lewisville Lake Office, 1801 N. Mill Street, Lewisville, Texas
10 am Wednesday, August 2, 2017

The North Central Texas Council of Governments (NCTCOG), Texas Parks and Wildlife Department (TPWD), and US Army Corps of Engineers (USACE) met on Wednesday, August 2, 2017 at 10 am at the USACE Lewisville Lake Office in Lewisville, Texas. The following individuals were present:

Vicki Akers, USACE
Art Archambeau, USACE
Berrien Barks, NCTCOG
Brandon Childers, TPWD
Nathan Drozd, NCTCOG
Brad Hood, TPWD
Rob Jordan, USACE
Craig Kislingbury, USACE
Jennifer Linde, USACE
Rich Mahoney, TPWD
Randy Merchant, USACE
Brandon Mobley, USACE
Chris True, TPWD
Marty Underwood, USACE
Greg Webb, USACE
Sandy Wesch, NCTCOG
Kate Zielke, NCTCOG

Presentation

NCTCOG gave a presentation on the history of the Denton County Outer Loop project, which could potentially cross the Denton Greenbelt. The presentation described a 2011 feasibility study that found that an east-west route in Denton County may be warranted based on expected growth in population and employment. The 2011 feasibility study projected that more than 40,000 vehicles per day would travel this route. Kate Zielke described comments provided by TPWD during the 2011 study, which included:

- An alignment should be restricted to an existing east-west corridor through the Greenbelt
- TPWD and USACE should be included in future planning
- Impacts on habitat, wildlife, park visitation, and park use should be avoided and minimized
- Mitigation opportunities and the cost to offset impacts should be integrated into the early planning process

Kate said the Denton County Outer Loop was included in Mobility 2040 as a freeway with six freeway lanes and six continuous frontage lanes. Mobility 2040 is the region's long-range transportation plan. Kate discussed NCTCOG's upcoming feasibility study on the Denton County Outer Loop. She said the study will include recommendations for sustainability best practices that will be identified using grant funding from the Federal Highway Administration. She said NCTCOG is meeting with non-profit

stakeholders and other parties interested in the Denton Greenbelt. Sandy Wesch said meetings with transportation stakeholders also would be conducted.

Kate described goals established by federal transportation legislation and Mobility 2040 that are compatible with conservation and recreation, including goals to preserve and enhance the natural environment and to promote active lifestyles.

Stakeholders' Priorities

NCTCOG sought feedback from USACE and TPWD regarding the right-of-way identified in the deed for Farm-to-Market Road (FM) 428, an alignment that will be considered in the feasibility study. USACE representatives indicated that the Texas Department of Transportation (TxDOT) owns the right-of-way but may not know its width. USACE said they could assist in determining the width of the right-of-way if TxDOT does not know it. Sandy said she would follow up with TxDOT; she said the corridor could be kept mutable to create the least impact on the state park and USACE property.

NCTCOG also sought feedback from USACE and TPWD on their priorities in the corridor. It was noted that a historic bridge is located adjacent to FM 428 and that walking, biking, equestrian, and paddle trails would be crossed by the roadway. Representatives from TPWD expressed concern about wildlife crossings, noting that the Greenbelt is an important, continuous wildlife corridor. Chris True with TPWD said wildlife can cross the existing two lanes but would need accommodations to cross a six-lane roadway. The potential for elevating the roadway to allow animals to cross underneath and to accommodate a 100-year-flood were discussed. Sandy said the use of a guardrail would be preferred over the use of fences. Rich Mahoney of TPWD said he would send NCTCOG a trail map in GIS format. Sandy said designs would consider the egress required by 18 wheelers, which would cover the needs of horse trailers.

Marty Underwood said the corridor was bordered by fee land and agricultural land. Chris discussed relocating parking to the south side of the roadway. USACE said parking could be located on the fee land but not on the conservation easement. Sandy said space under the bridge could be used for parking. Kate said this may deter wildlife from traveling under the bridge.

The restrictions created by the conservation easement were discussed. The easement is in perpetuity and states that no roads would be allowed on the easement. Overcoming this easement may require efforts from Congress or the Secretary of the Army because the easement is unusually restrictive, attendees noted. It was noted that the easement would make it impossible to build outside the right-of-way. USACE provided a copy of the easement to NCTCOG.

TPWD discussed the process for Section 4(f) of the Department of Transportation Act, stating that typically TxDOT includes the 4(f) process concurrently with the environmental process. TPWD would like to see a more finalized design from TxDOT before signing off on any 4(f) for the Denton County Outer Loop. Impacts to the historic bridge would trigger reviews for Section 4(f) and Section 106 of the National Historic Preservation Act. The height of a bridge for the roadway also could trigger 4(f) if it creates a visual obstruction within the park; it also may create sound impacts. The shade created by the bridge could prevent the re-establishment of vegetation in that area; also, silt deposits must be managed. Brandon Mobley said the existing pedestrian bridge is located in the right-of-way.

Sandy said NCTCOG will conduct a feasibility study, not a National Environmental Policy Act (NEPA) study. The feasibility study will identify an alignment and the cost of the project; no money has been identified to construct the roadway. She said this timeline can provide a win-win by providing mitigation that enhances the park and parking area. Chris True said an expansion of the park would allow it to better serve the region's growing population.

Sandy said the width of the roadway through the Greenbelt could be restricted to the existing right-of-way by reducing the inside shoulder or other design techniques; however, outside the Greenbelt the roadway would include additional lanes. She said 40,000 vehicles per day could be accommodated by a four-lane roadway, but frontage lanes would provide an alternative if the main lanes were closed by an accident or other incident. USACE said a conservation easement may not allow a construction easement and a construction easement may not be allowed on fee land if it is a sensitive environmental area. Private property may need to be purchased to rebuild the park access road, which may currently be located in the TxDOT right-of-way. TPWD said state Parks and Wildlife Code Title 3 Chapter 26 addresses impacts to a park. Intensive archeological testing and digging may need to be conducted in the stream, which may contain archaeological deposits.

Sandy said that the project would likely require an Environmental Assessment (EA) instead of an Environmental Impact Statement. She said USACE may be asked to be a cooperating agency. She said the EA would identify the best way to accommodate wildlife crossings. USACE said it has purchased a flowage easement that provides flood storage capacity west of the Greenbelt. Sandy said plans will have to ensure a conveyance for flood water is provided.

Sandy described a network of trails in the Dallas-Fort Worth region that is known as the Veloweb. She said that the Greenbelt Trail could potentially be connected to the Veloweb.

TPWD discussed mitigation options that could address invasive species, including Chinese privet and feral hogs. Lewisville Lake Environmental Learning Area has researched methods to control privet. The project also needs to address freshwater mussels and invasive zebra mussels. Sandy said TxDOT would conduct a mussel survey.

Next steps were identified:

- NCTCOG will discuss the right-of-way with TxDOT.
- TPWD will provide NCTCOG GIS data of the trail system, including paddle trails.
- NCTCOG will seek comments from USACE and TPWD on the design of the roadway.
- Rob Jordan will serve as the primary point of contact for the project, and NCTCOG will notify him of future stakeholder meetings.
- USACE may want to initiate the EA at the beginning of the NEPA study.
- NCTCOG's bicycle-pedestrian staff can look at opportunities to connect the Greenbelt trail with the Veloweb.

Investing in Sustainability

Denton Greenbelt Stakeholder Meeting #1

June 6, 2017

North Central Texas
Council of Governments

Agenda

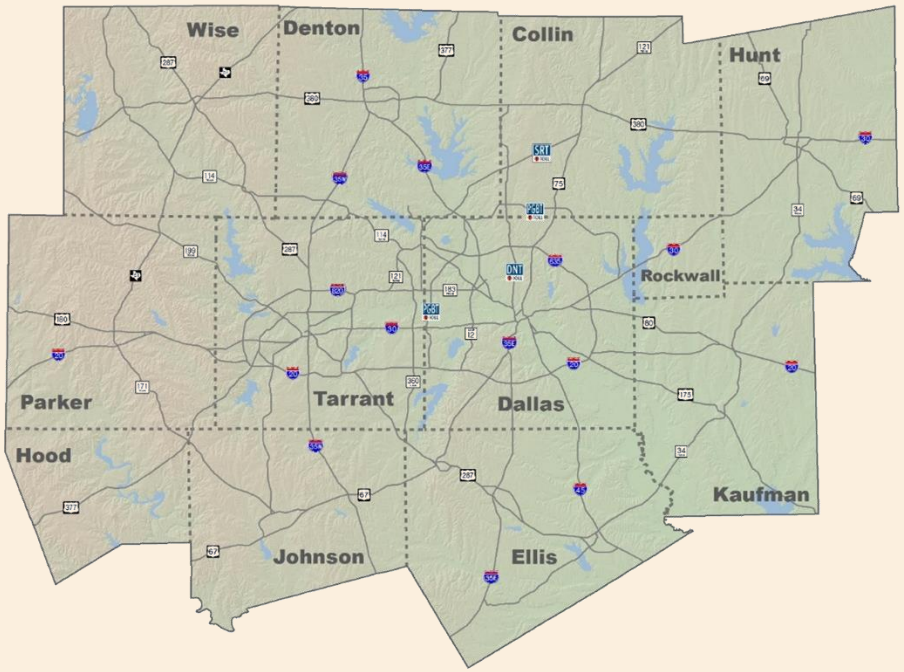
1. Introductions
2. NCTCOG's role in transportation planning
3. Demand for the Outer Loop highway project
4. Sustainability and environmental stewardship
5. Stakeholders' interests
    - Environmental priorities
    - Needs of hikers and equestrians
    - Future stakeholder meetings

Introductions

- These stakeholder meetings will identify sustainability and environmental stewardship needs in the Denton Greenbelt.
- Representatives from:
  - City of Dallas
  - City of Denton
  - Cross Timbers Equestrian Trails Association
  - Greenbelt Alliance
  - Lake Ray Roberts Equestrian Trails Association
  - North Central Texas Council of Governments
  - Texas Parks & Wildlife Department
  - Upper Trinity Regional Water District
  - US Army Corps of Engineers
  - Venable Ranch
  - Others?

NCTCOG and Transportation Planning

The **North Central Texas Council of Governments** (NCTCOG) is the metropolitan planning organization for the 12-county Dallas-Fort Worth region. NCTCOG's Transportation Department conducts long-range transportation planning for this region.



NCTCOG and Transportation Planning

The Regional Transportation Council is the metropolitan planning organization's policy board, and is composed of local elected officials.

NCTCOG and Transportation Planning

Based on input from transportation partners, NCTCOG identifies the need for new transportation facilities or expanded transportation facilities.

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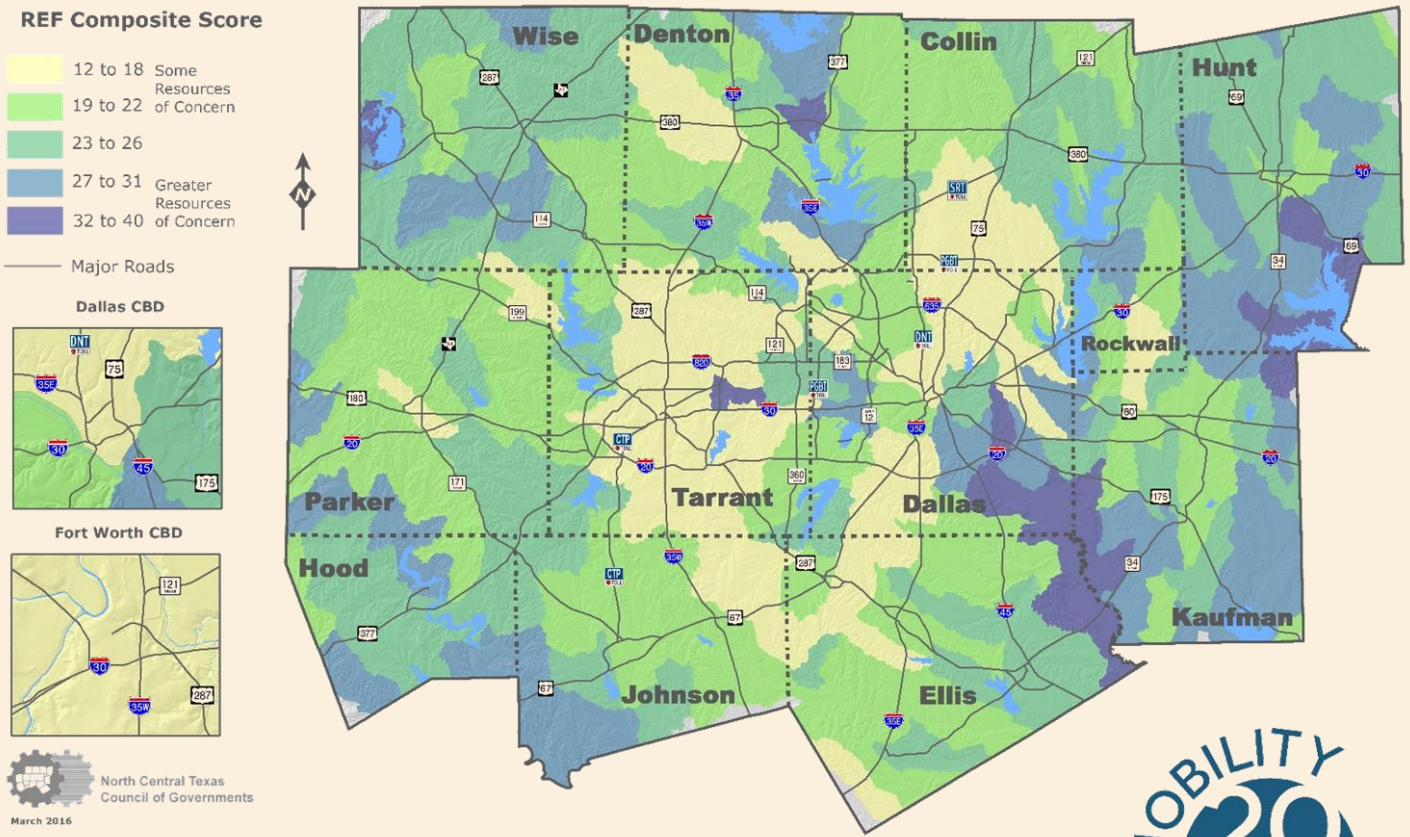
NCTCOG and Transportation Planning

These facilities are included in a metropolitan transportation plan, which is approved by the Regional Transportation Council.

Plans are refined with further studies and feedback from a variety of stakeholders.

NCTCOG and Transportation Planning

Regional Ecosystem Framework: Composite Map

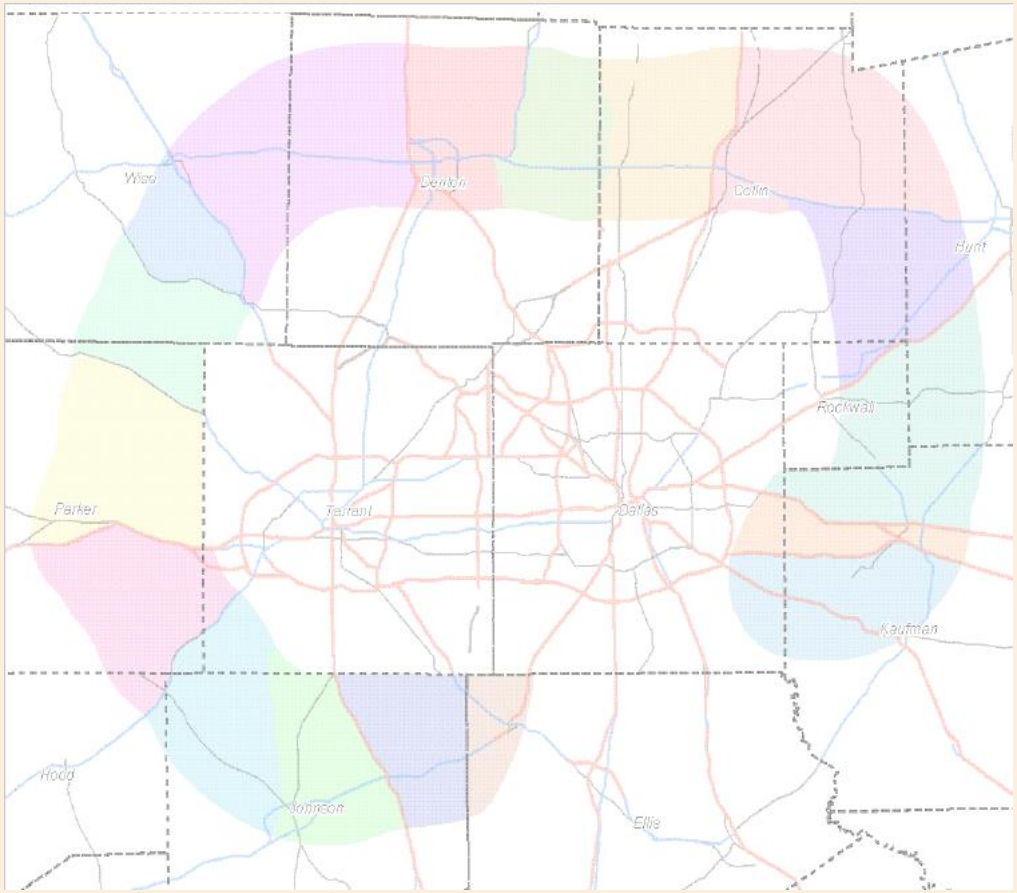


The Regional Ecosystem Framework: Composite score represents the combined score of all 10 REF layers. A higher score indicates that resources of relatively high concern may be present and that additional review, documentation, and consultation with the applicable agency may be needed. The REF layers include: Green Infrastructure (Wildlife Habitat, Natural Areas, Agricultural Land); Water Quality and Flooding (Impaired Water Segments, Flood Zones, Surface Water Quantity, and Wetlands); and Ecosystem Value (Rarity, Diversity, and Ecosystem Sustainability). Data sources include the Texas GRID and EPA Region 6 Regional Ecosystem Assessment Protocol data. This information has been developed for the Dallas-Fort Worth MPA for use in long-range planning. These scores are meant to be used as a preliminary screening tool for potential impact identification. For more information on the calculations for this layer, please visit www.nctcog.org/REF.

NCTCOG seeks to address environmental concerns early in the planning process.

Demand for Outer Loop

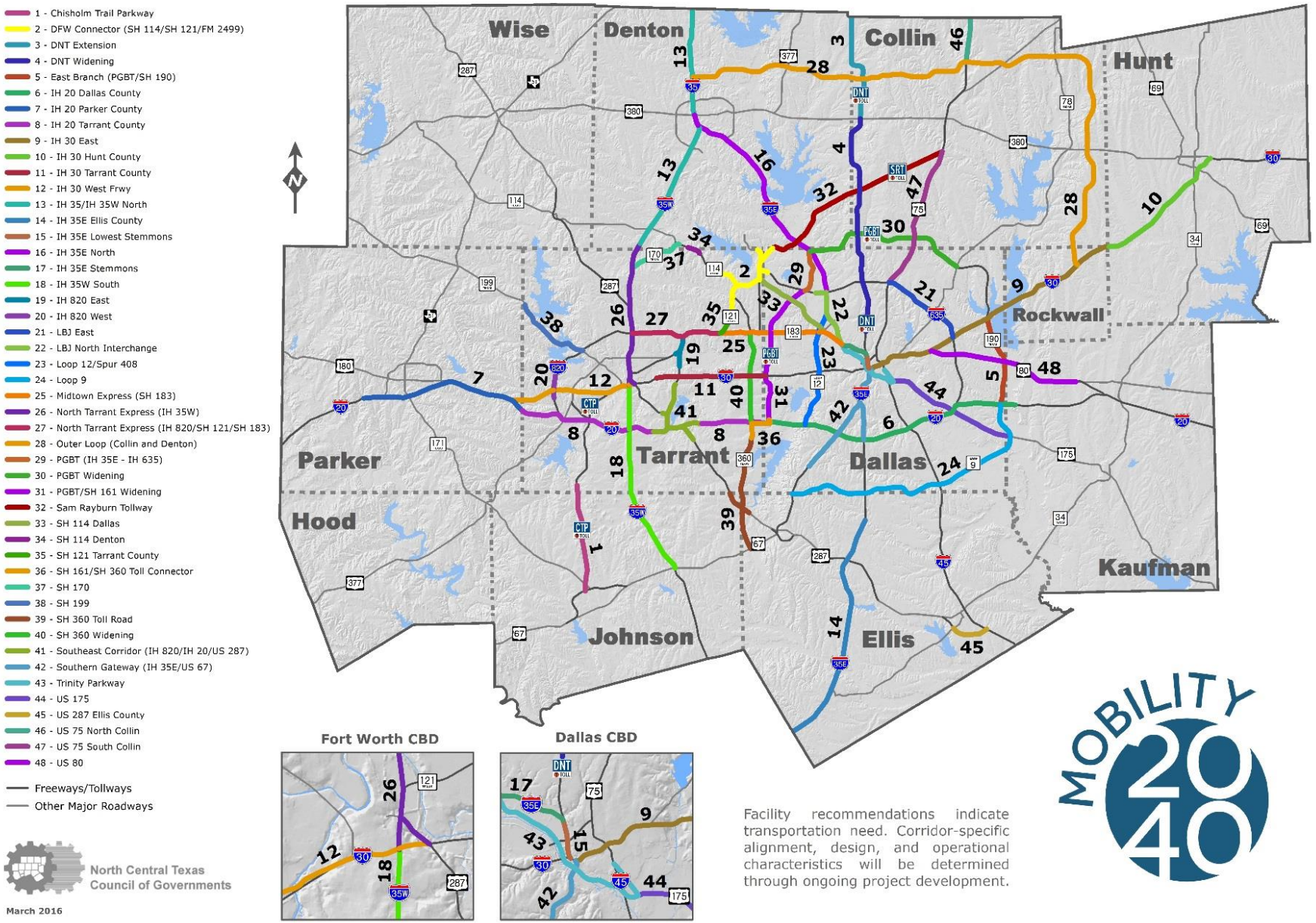
A Regional Outer Loop was conceptualized in the early 2000s. The new highway would encircle the Dallas-Fort Worth region.



Demand for Outer Loop

- NCTCOG completed a feasibility study on the project in 2011.
- The study found that only portions of the loop were warranted
  - Denton County
  - Collin County
- These facilities were included in Mobility 2040.

Highway Corridor Projects



Facility recommendations indicate transportation need. Corridor-specific alignment, design, and operational characteristics will be determined through ongoing project development.

North Central Texas Council of Governments

March 2016

Demand for Outer Loop

Population Growth

County	1990 Population	2000 Population	2010 Population	2040 Population (Forecasted)
Denton	273,525	432,976	662,614	1,241,681
Collin	264,036	491,675	782,341	1,560,421
Region	4,013,418	5,197,317	6,417,724	10,676,844

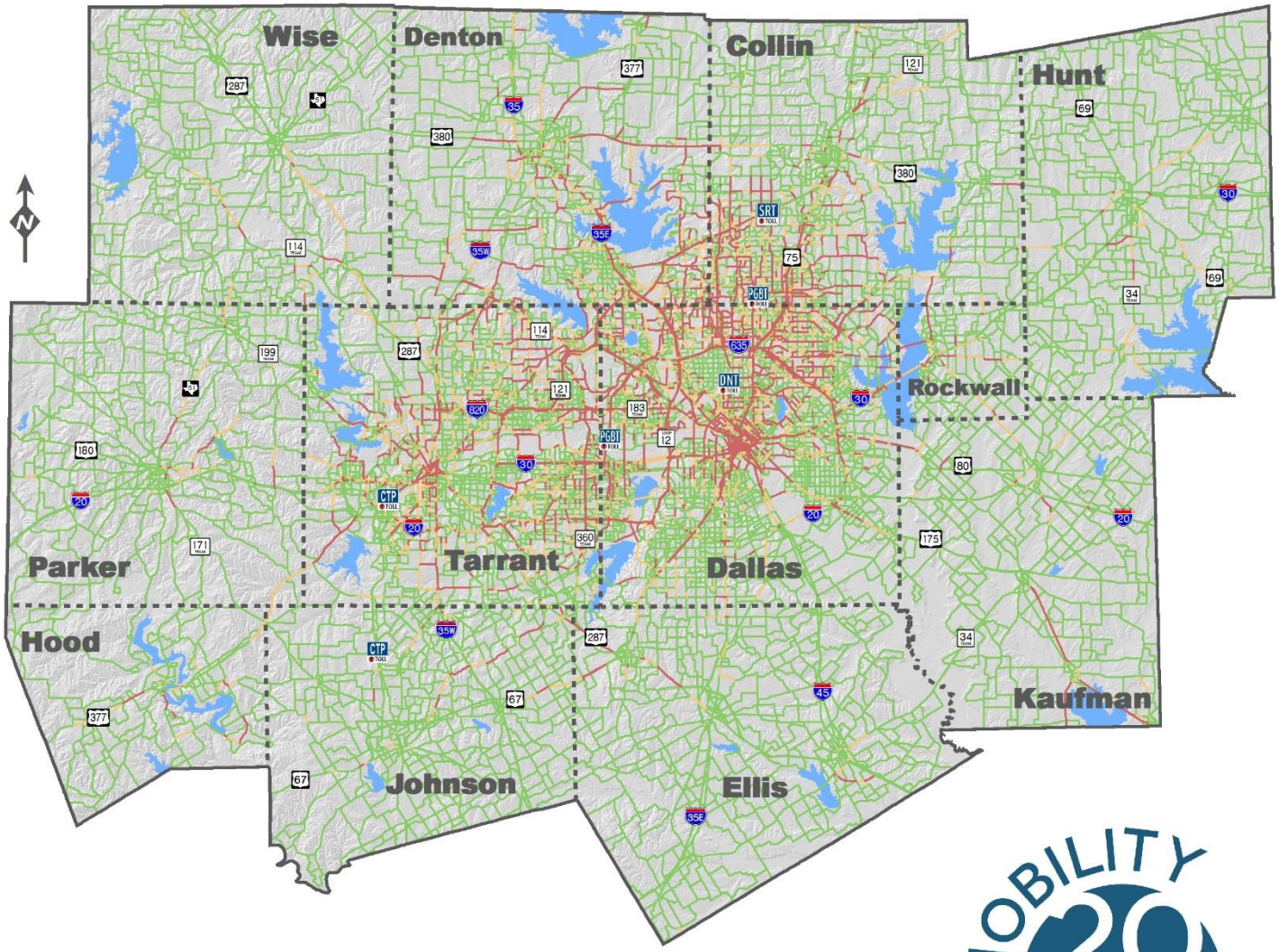
Employment Growth

County	2017 Employment (Forecasted)	2040 Employment (Forecasted)
Denton	298,071	445,070
Collin	542,493	762,920
Region	4,584,235	6,691,449

2017 Peak Hour Level of Service

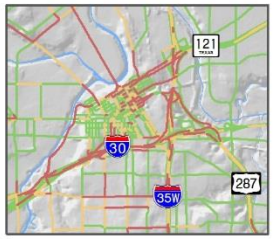
Levels of Service

- ABC
- DE
- F



Dallas CBD

Fort Worth CBD



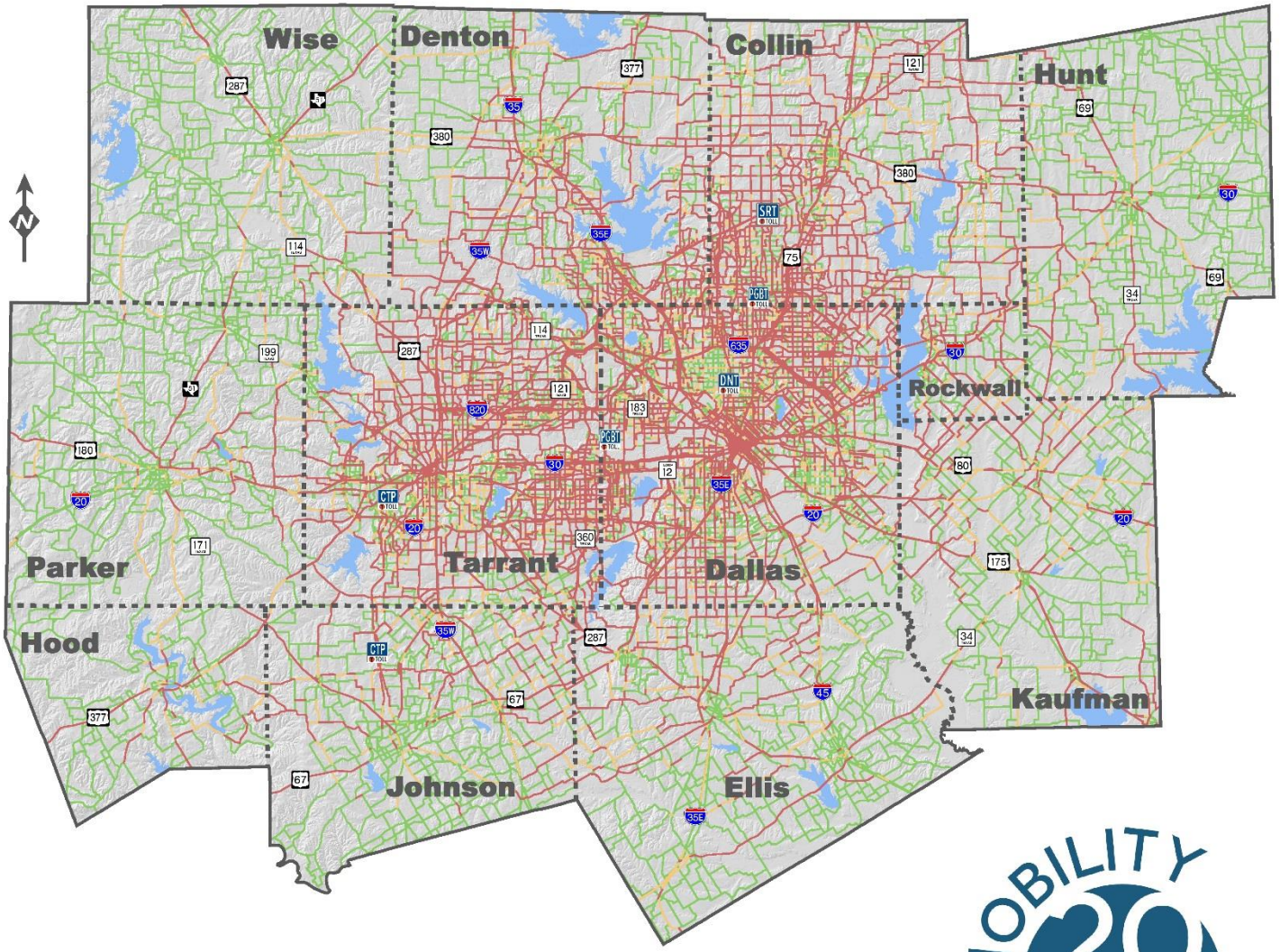
North Central Texas Council of Governments

June 2016

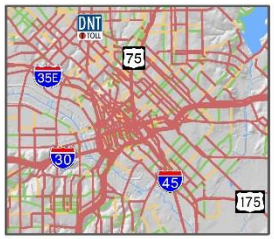
2040 No-Build Peak Hour Level of Service

Levels of Service

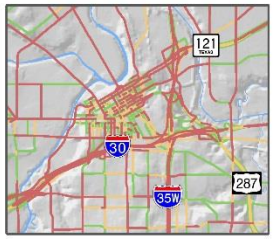
- ABC
- DE
- F



Dallas CBD



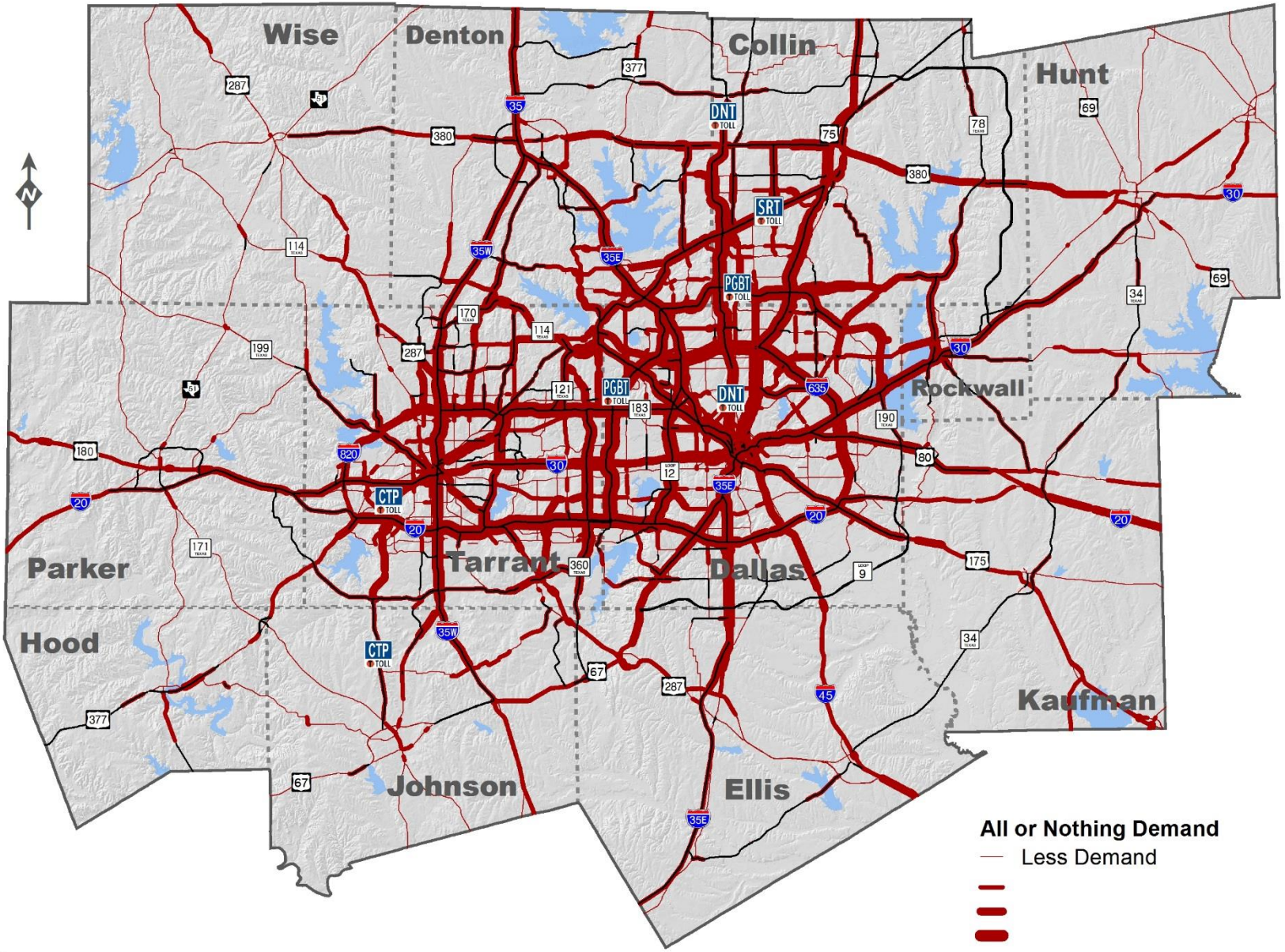
Fort Worth CBD



North Central Texas Council of Governments

March 2016

2040 All-or-Nothing Weekday Demand

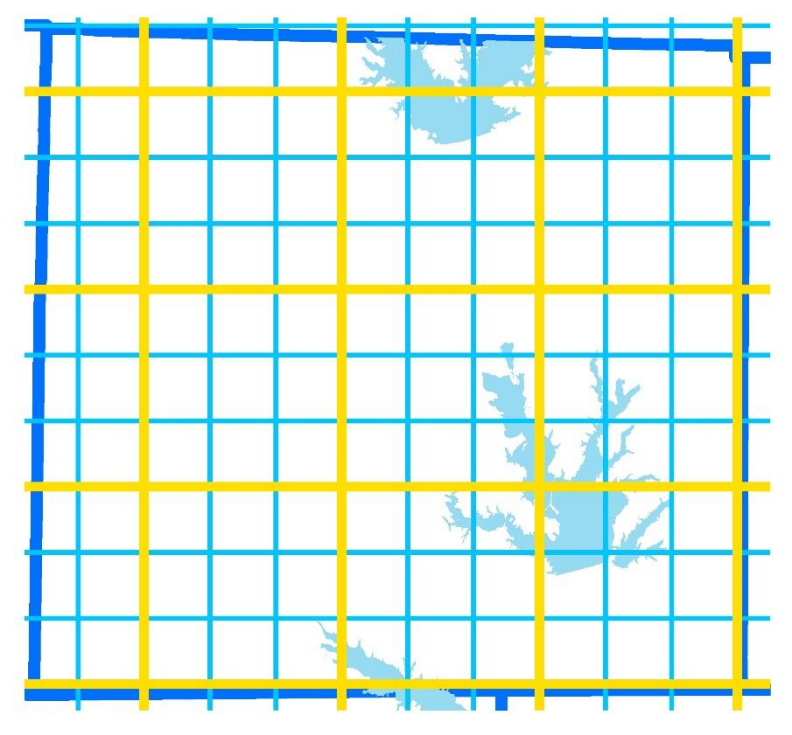


North Central Texas Council of Governments

Demand for Outer Loop

Theoretical facility spacing:

- Freeways ≈ 10 miles
- Principal arterials ≈ 2 to 5 miles



Demand for Outer Loop

Proposed timeline for Denton County Outer Loop/Greenbelt Parkway:

- 2 lanes of continuous frontage roads by 2027
- 6 lanes of continuous frontage roads by 2037
- 6 lanes of freeway by 2040

Demand for Outer Loop

Plans for new feasibility study:

- Assess needs
- Identify solutions
- Preliminary-level review of the affected environment
- Incorporate sustainability and environmental stewardship best practices recommended by Federal Highway Administration sustainability tool, INVEST

INVEST
ECONOMIC • SOCIAL • ENVIRONMENTAL

Sustainability and Environmental Stewardship

The INVEST tool is used to address the economic, social, and environmental sustainability of transportation projects.

Goals:

- Reduce impacts to natural environment
- Increase social and economic benefits

Sustainability and Environmental Stewardship

- Address sustainability early in planning process to increase chance of success
- Prioritize suggestions because not all will be achievable

Stakeholders' Interests

- Environmental priorities?
- Needs of hikers and equestrians?
- Frequency and timing of future stakeholder meetings?

Getty Images

Contact Information

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MEETING SUMMARY

Denton Greenbelt Stakeholders Meeting
Rancho de la Roca, 2459 Blackjack Road West, Aubrey, Texas
1 pm, Tuesday, June 6, 2017

The Denton Greenbelt Stakeholders met on Tuesday, June 6, 2017 at 1 p.m. at Rancho de la Roca in Aubrey, Texas. The following individuals were present:

Frank Abbott, Kimley-Horn
Blake Alldredge, Upper Trinity Regional Water District (UTRWD)
Katherine Barnett, City of Denton
Tim Beaty, Greenbelt Alliance
Ken Dickson, Greenbelt Alliance
Nathan Drozd, North Central Texas Council of Governments (NCTCOG)
Rob Jordan, US Army Corps of Engineers (USACE)
Jennifer Linde, USACE
Amanda Long-Rodriguez, NCTCOG
Rick Martino, Greenbelt Alliance
Linda Moore, Lake Ray Roberts Equestrian Trails Association (LRRETA)
Carol Nichols, Lake Ray Roberts Equestrian Trails Association (LRRETA)
Paul Nealy, USACE
Jason Pierce, UTRWD
Richard Rogers, Greenbelt Alliance
Kyle Roy, NCTCOG
Ben A. Stephenson, City of Dallas
Chris True, Texas Parks & Wildlife Department
Joe Tydlaska, Venable Ranch
Wes Tydlaska, Venable Ranch
Marty Underwood, USACE
Roy Wilshire, Kimley-Horn
Nick Wilson, USACE
Kate Zielke, NCTCOG

Presentation
Kate Zielke, a transportation planner with NCTCOG, said the stakeholder meeting sought to identify sustainability and environmental stewardship needs in the Denton Greenbelt. She said forecasted growth in population and employment in the area would create a need for a highway that would bisect the park. As a result, the Denton Counter Outer Loop/Greenbelt Parkway was included in Mobility 2040, the long-range transportation plan for the Dallas-Fort Worth region. Kate explained the role NCTCOG and the Regional Transportation Council (RTC), a policy board composed of local elected officials, play in transportation planning in the region.

Kate said NCTCOG would conduct a study to assess transportation needs in the area, identify transportation solutions, and provide a preliminary-level review of environmental effects. She said NCTCOG would use an online tool created by the Federal Highway Administration to identify sustainability best practices to include as recommendations in the study. Kate stated sustainability

recommendations were more likely to be implemented if they were introduced early in the planning process.

Stakeholders' Priorities

Stakeholders discussed their concerns and requests:

Trails: Hiking and equestrian trails should be open throughout construction, and users of the trails should not have to cross vehicle traffic. The trailhead at Farm-to-Market Road (FM) 428 should remain. Trails should be a priority because they are key to quality of life in the region. LRRTA has received grants from the Texas Parks and Wildlife Department (TPWD) to sustain the trail, but it needs constant maintenance. Access to fishing should still be possible. Steps should be taken to prevent flooding and sedimentation at the trailhead at US 380; these issues often close this trailhead.

Horse trailers: Trailhead parking lots should accommodate 20 horse trailers, though larger lots may be necessary as the region's population grows. Roadway design should address safety concerns associated with horse trailers; long turn lanes should be considered.

Wildlife: Deer and turtles may not be able to cross FM 428 if traffic increases. Not disrupting the Greenbelt or wildlife is a priority of USACE, which owns the Greenbelt. A safe crossing for wildlife should be created.

Noise pollution: Noise pollution should be limited to preserve the natural sounds of the park. Sound impacts must be mitigated.

Light pollution: Light pollution should be limited to allow the park to maintain a natural night sky. Light pollution could affect migratory birds.

Aesthetics: The natural aesthetics of the park should be maintained. Because FM 428 is the "front door" to the Greenbelt, the aesthetics of the new roadway itself are important. Educational features describing the Greenbelt should be included.

Ownership of land: The Greenbelt is owned by USACE and is bordered by conservation easements held in perpetuity by USACE. The agency is not aware of ever authorizing construction on its easements. FM 428 is owned by the Texas Department of Transportation (TxDOT); a preliminary review of the deed shows it has a 150-foot right-of-way. Initial planning meetings should address these topics.

Historic structures: The historic Elm Fork Bridge is within the right-of-way.

Access by utilities: The planned roadway could open the Greenbelt to development by utility companies, which would be undesirable.

Alternative alignments: Alternatives will be identified further into the planning process. Alternatives are limited by the location of Ray Roberts Lake and Lewisville Lake. FM 455, which travels over a dam, would not be a possible alternative. Alternatives must be presented during a public meeting.

Roadway footprint: The six lanes of highway and six lanes of frontage roads recommended in Mobility 2040 would require at least 250 feet of right-of-way. Stakeholders sought information on when the footprint of the highway would be known, so trees could be planted as noise mitigation. An elevated highway could create sound impacts and affect the park's aesthetics.

Mitigation: Stakeholders asked whether off-site mitigation was possible and offered to brainstorm mitigation ideas.

Water quality: The Elm Fork of the Trinity River is an important waterway. The use of oil-debris separators was suggested.

Future meetings: Quarterly meetings were suggested during the length of the project.

Similar projects: NCTCOG was asked to research similar projects across the nation to see how these issues have been addressed.

Investing in Sustainability

Transportation Planning

Metropolitan planning organizations (MPO) conduct long-range transportation planning in urbanized areas with populations that exceed 50,000. In the Dallas-Fort Worth region, the MPO is composed of a policy board of local elected officials and the Transportation Department at the North Central Texas Council of Governments (NCTCOG).

MPOs coordinate with the public, local governments, and other transportation agencies to build a consensus on the region's transportation needs. NCTCOG develops a long-range Metropolitan Transportation Plan, which identifies roadway, transit, bicycle, and pedestrian projects that will meet the region's needs and for which funding can be expected to be available. A short-range plan is then created that identifies projects that are immediate priorities. The Texas Department of Transportation includes those priority projects in its own short-range plan.

Regional Transportation Council

The RTC sets transportation policy for NCTCOG. The 43-member board consists primarily of local elected officials.

Promoting Sustainability in the Denton Greenbelt

Sustainability and environmental stewardship efforts such as the project being launched in the Denton Greenbelt are in step with the region's transportation planning goals. The Dallas-Fort Worth region's long-range Metropolitan Transportation Plan addresses federally required goals for transportation planning that include environmental sustainability. The plan also addresses local goals, including promoting active lifestyles and preserving and enhancing the natural environment.

The transportation planning process requires input from the public and from stakeholders affected by transportation plans. The North Central Texas Council of Governments is engaging stakeholders from non-profit groups, natural resource agencies, and municipalities to integrate their feedback into plans for a roadway that will cross the Denton Greenbelt.

Plans for this possible roadway also will include best management practices for sustainability. These practices will be identified using an online tool developed by the Federal Highway Administration. The tool, called INVEST, provides a means for agencies that plan or build transportation projects to evaluate the sustainability of new projects across all phases, from planning to construction to maintenance.

Transportation partners will consider the sustainability best management practices as they engineer and construct the roadway. They will work to avoid and minimize impacts to the environment, will identify strategies to mitigate impacts that occur, and may consider context-sensitive solutions that preserve the aesthetic and environmental qualities of the Denton Greenbelt.

Photo: Getty Images

Integrating Environmental Considerations into Transportation Planning

The natural environment has been a factor in planning at the North Central Texas Council of Governments (NCTCOG) since 2011, when the agency developed its Regional Ecosystem Framework (REF). This mapping tool, developed in partnership with the Environmental Protection Agency and other organizations, functions as an early screening tool to identify ecosystem priorities at the scale of the subwatershed. The REF focuses on three ecosystem-related categories:

- Water considerations
- Ecosystem value
- Green infrastructure

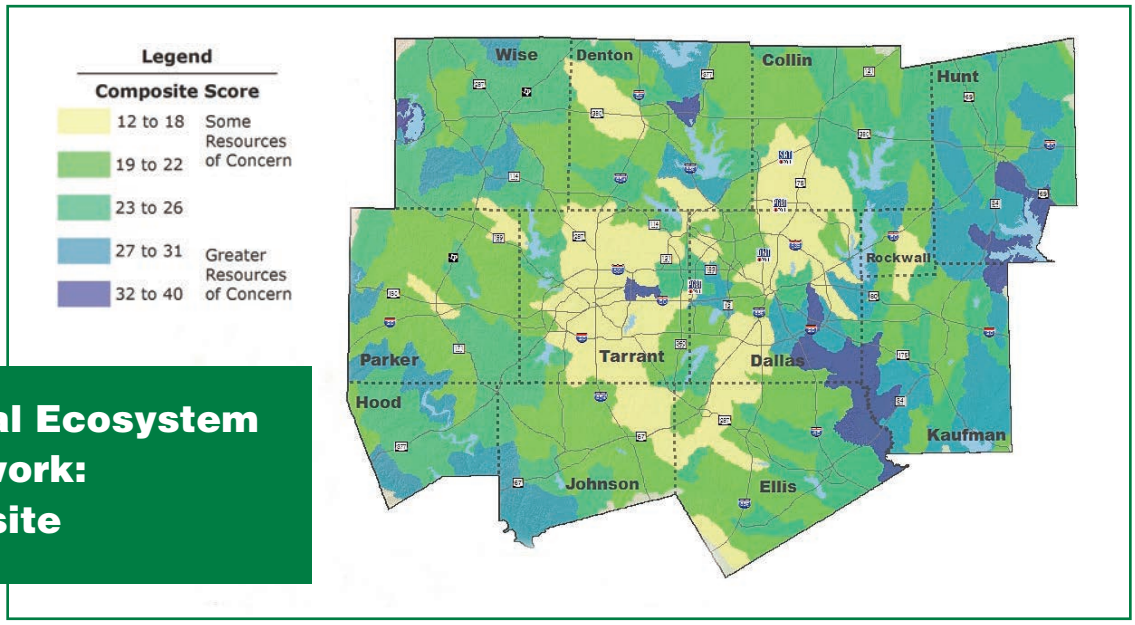
The tool is based on the Federal Highway Administration's "Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects" and was developed with funding from that agency. An ecosystem approach calls for infrastructure and environmental agencies to work with each other and the public to integrate the agencies' plans and to identify environmental priority areas.

The REF was used to identify potential conservation, preservation, and mitigation sites in the planned Loop 9 corridor in southern Dallas County. The tool also was used to conduct a comprehensive environmental analysis of alternative locations for Loop 9.

In addition, a REF website is publicly available and has been used by consultants to screen for potential environmental impacts. The website includes the Regional Ecosystem Framework and 40 additional layers of data related to the environment and historic properties.

Also, during the transportation planning process, NCTCOG consults with agencies that manage and regulate environmental resources. For example, in another past project, a stakeholder group of representatives from these agencies helped NCTCOG identify potential stream restoration sites, emphasizing sites where restoration would provide the greatest benefit to the environment. These sites could then be used to compensate for the impacts on streams created by future transportation projects.

For more information on these projects, please see **www.nctcog.org/REF**.



Regional Ecosystem Framework: Composite

North Central Texas Council of Governments

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MEETING SUMMARY

Transportation Partners Meeting
North Central Texas Council of Governments
616 Six Flags Drive, Centerpoint Two, Arlington, Texas
9 a.m., Thursday, October 5, 2017

The North Central Texas Council of Governments (NCTCOG) met with transportation partners on Thursday, October 5, 2017 at 9:00 at NCTCOG's offices in Arlington, Texas. The following individuals were present:

Todd Estes, PE, City of Denton
Pritam Deshmukh, PE, City of Denton
Noreen Housewright, PE, City of Denton

NCTCOG staff:
Michael Bridges
Patricia Rohmer
Sandy Wesch

Discussion
The City of Denton staff discussed current development and the following Capital Improvement Projects:

- The Bonnie Brae Street project will be widened from a 2-lane undivided facility to a 4-lane divided facility from Vintage Blvd. to IH 35E; and from a 2-lane undivided facility to a 6-lane divided facility from IH 35W frontage road to US 377. The estimated schedule for Phase 1 is July 2017 to July 2019.
- Mayhill Road (Edwards Road to US 380) will be widened from a 2-lane undivided facility to an ultimate 6-lane divided facility. The estimated schedule is September 2017 to March 2020.
- Water Works Park Additions located on the northeast quadrant of FM 428 and Loop 288.
- Denton Soccer Complex Phase II Construction located east of Bonnie Brae Street, south of Loop 288.

Other improvements also were discussed:

- Texas Department of Transportation improvements on IH 35E are from Turbeville Road to US 380. The project is design-build.
- US 380 is under construction from Bonnie Brae Road to US 377, from 4-lane to 6-lane urban divided roadway.

Regarding Denton County Outer Loop, city staff indicated a route alternative from Aubrey along FM 428 (Sherman Drive) to Loop 288 and IH 35E is preferable, rather than a route along Milam Road to IH 35E. An extension of the Loop 288 corridor as a freeway west of the city of Denton between IH 35E and IH 35W is proposed, so a route along Loop 288 would be best. The use of Loop 288 would allow better connectivity with through the City of Denton with the predicted growth, especially from The University of North Texas.

Next Steps

A meeting with other transportation partners (Denton County/John Polster, HDR Consultants, city of Denton, and Texas Department of Transportation) should be scheduled. John Polster should be contacted for an updated Denton County Thoroughfare Plan.

People, wildlife, and water all travel, but what happens when their paths cross?

A new highway is being planned to help residents commute between Denton and Collin counties. This highway will cross the Denton Greenbelt, a conservation area that:

- Allows wildlife to travel between Lake Ray Roberts and Lewisville Lake
- Protects the water quality of the Elm Fork of the Trinity River
- Provides trails for hikers, bicyclists, equestrians, and paddlers.

How can so many things occur in one place? Planners are identifying sustainability practices that can balance the social, economic, and environmental effects of the highway on Denton County and the Greenbelt. They will study several highway routes to find the best path to get people where they need to go, in the most financially responsible way, while disturbing people and nature as little as possible. They are also seeking feedback from people passionate about the Greenbelt and those who travel in Denton County.

How can you be involved?

People can speak up about plans to balance the need for transportation with the need for conservation in the Greenbelt during stakeholder meetings with the North Central Texas Council of Governments. The next meeting will be on **Tuesday, December 5 at 1 p.m**. The meeting will take place at Rancho de la Roca in Aubrey.

If you can't make the meeting, you can email your comments to **transinfo@nctcog.org** or fill out a public comment form. Progress on the project will be posted at **www.nctcog.org/REF** under the heading "INVEST."

The North Central Texas Council of Governments is a voluntary association of local governments established in 1966 to assist local governments in planning for common needs, cooperating for mutual benefit and coordinating for sound regional development. Planners have met with Texas Parks & Wildlife Department and the US Army Corps of Engineers to discuss the new highway; they also will meet with representatives from local governments. This project is supported with a grant from the Federal Highway Administration.

Investing in Sustainability

Denton Greenbelt Stakeholder Meeting #2

December 5, 2017

North Central Texas
Council of Governments

Agenda

1. Introductions
2. Past and future outreach efforts
3. Case studies – segmented parks/natural areas
4. Feasibility study update

Introductions

- These stakeholder meetings will identify sustainability and environmental stewardship needs in the Denton Greenbelt.
- Representatives from:
  - City of Aubrey
  - City of Dallas
  - City of Denton
  - Cross Timbers Equestrian Trails Association
  - Greenbelt Alliance
  - Lake Ray Roberts Equestrian Trails Association
  - North Central Texas Council of Governments
  - Texas Parks & Wildlife Department
  - Upper Trinity Regional Water District
  - US Army Corps of Engineers
  - Venable Ranch

Outreach

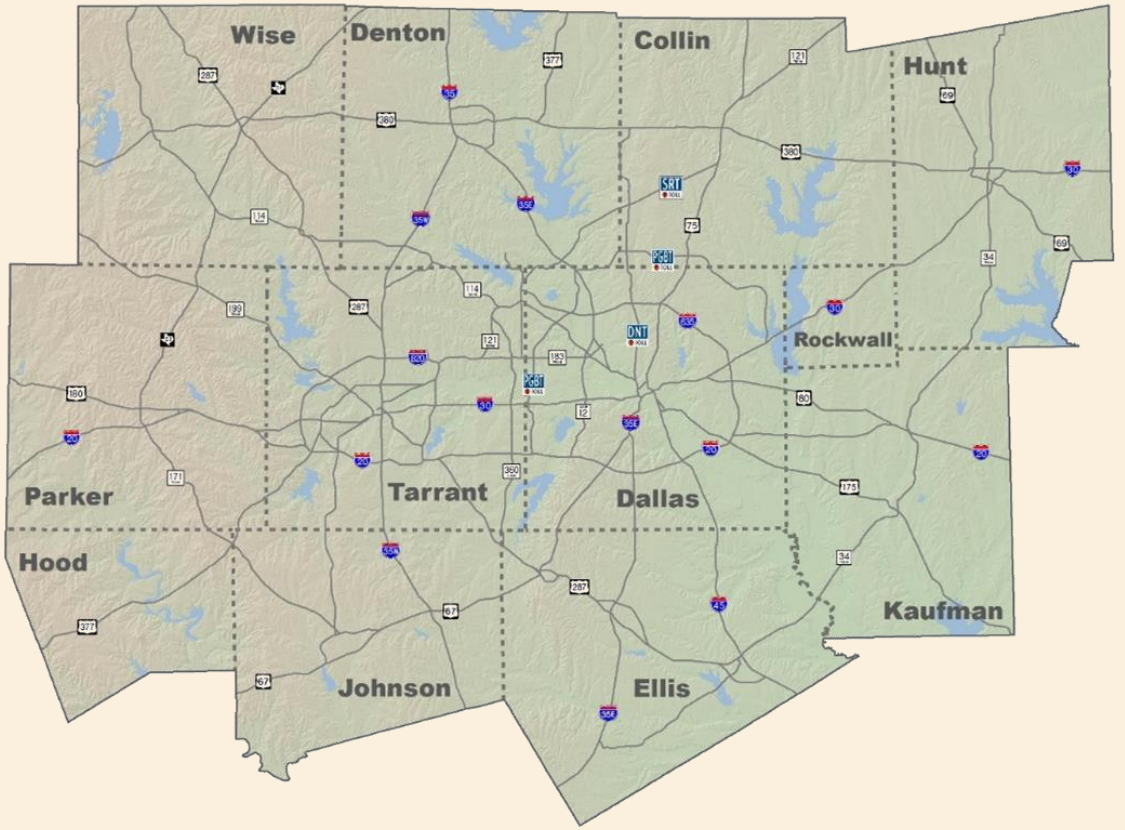
Past Outreach – Environmental Stakeholders

Role of NCTCOG – transportation planning, environmental considerations

Need for east-west travel

Environmental and recreational priorities

Meeting summary



Past Outreach – USACE and TPWD

Width of existing right-of-way

Historic bridge

Wildlife needs

Conservation easements

Park impacts

NCTCOG photo

Past Outreach – Aubrey Peanut Festival

People, wildlife, and water all travel, but what happens when their paths cross?

A new highway is being planned to help residents commute between Denton and Collin counties. This highway will cross the Denton Greenbelt, a conservation area that:

- Allows wildlife to travel between Lake Ray Roberts and Lewisville Lake
- Protects the water quality of the Elm Fork of the Trinity River
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How can so many things occur in one place? Planners are identifying sustainability practices that can balance the social, economic, and environmental effects of the highway on Denton County and the Greenbelt. They will study several highway routes to find the best path to get people where they need to go, in the most financially responsible way, while disturbing people and nature as little as possible. They are also seeking feedback from people passionate about the Greenbelt and those who travel in Denton County.

Case Studies

Case Studies – Segmented Parks/Natural Areas

Requested by stakeholders during first meeting

Five case studies of parks/natural areas segmented by a roadway:

- Purpose and Need
- Park Segmented
- Impacts to the Environment
- Mitigation
- Result/Status

1. US 73-San Joaquin Tollroad

- Orange County, California, 1994
- San Joaquin Transportation Authority
- Expansion to 8 lanes

Purpose and Need	Segmented Area
Reduce congestion Access to recreational areas and University of California	Laguna Greenbelt: 22,000 acres, 6 wilderness parks 1. Crystal Cove State Park 2. Brommer-Shady Canyon Open Space 3. Alta Laguna Park 4. Laguna Coast Wilderness Park 5. Alisa and Wood Canyons Park 6. Jim Dilly Preserve

1. US 73-San Joaquin Tollroad

Significant Impacts	Mitigation	Status
• Wildlife corridors • Habitat • Listed and candidate species • Wetlands • Streambed modifications • Light/noise	• Wildlife under crossings, protective fencing • Avoided removal of native vegetation • No net loss wetlands • Water control devices • Special grade and slope design	• Litigation by nonprofits groups was denied in 1994 • Project proceeded in 1994

2. US 93 – The People's Way

- Missoula and Lake counties, Montana, 2002-Present
- Montana Department of Transportation
- Expansion to 4 lanes with turn lanes

Purpose and Need	Segmented Area
• A major north-south link abundant with tourism and resource industries • Safety concerns for both humans and wildlife	• Within Flathead Reservation, Land of the Confederated Salish and Kootenai Tribes • Between Lolo and Flathead National Forests

2. US 93 – The People's Way

Montana Department of Transportation

Significant Impacts	Mitigation	Status
• Cultural, spiritual (Salish and Kootenai tribes) • Listed species (grizzly bear, Canada lynx, bull trout) • Wildlife mortality and habitat fragmentation	• Extensive consultation with tribal peoples: "Spirit of Place" • 42 fish and wildlife crossings and 15 miles of fencing	• Project construction began in 2002 • Wildlife crossings are extensively studied

3. SR 84/I 75 – Alligator Alley

- Collier and Broward counties, southern Florida, 1993
- Florida Department of Transportation
- Expansion from 2 to 4 lanes

Purpose and Need	Segmented Area
• To link the east with a quickly developing and growing west • Safety concerns of existing road	• Fakahatchee Strand State Preserve • Florida Panther National Wildlife Refuge • Big Cypress National Park • Everglades National Preserve • Miccosukee Reservation

3. SR 84/I 75 – Alligator Alley

U.S. Fish and Wildlife

Federal Highway Administration

Significant Impacts	Mitigation	Status
• Habitat and wildlife mortality • Listed species (alligator and panther) • Wetlands • Cultural, spiritual (Seminole and Miccosukee tribes)	• 23 wildlife crossings, 65 miles of fencing, 12 bridge extensions, protective land purchase, educational campaign • Consultation with tribal peoples	• Opened in 1993 • Crossings installed on US-93

4. I-270/US 15 Multimodal Corridor

- Frederick and Montgomery counties, Maryland, present
- Maryland Department of Transportation
- Expansion depends on location

Purpose and Need	Segmented Area
• Vital connection from Maryland into the D.C. metropolitan area • Expected population and employment growth • High existing congestion and unreliable transit	• 13 parks or recreation areas directly impacted including • Seneca Creek State Park and Monocacy National Battlefield Park

4. IH 270/US 15 Multimodal Corridor

Significant Impacts	Mitigation	Status
• 77 water bodies, including Seneca Creek and Monocacy River • Wetlands • Forest land • Wildlife including threated fish species (pearl dace and comely shiner • Historic sites	• Compensatory wetland mitigation • Maryland Forest Conservation Act • Best Management Practices • Stream closures • Slope design	• Under design phase as of fall 2015

5. SH 100 – Ocelot

- Cameron County, Texas, present
- Texas Department of Transportation
- Concrete traffic barrier

U.S. Fish and Wildlife

TxDOT Pharr District

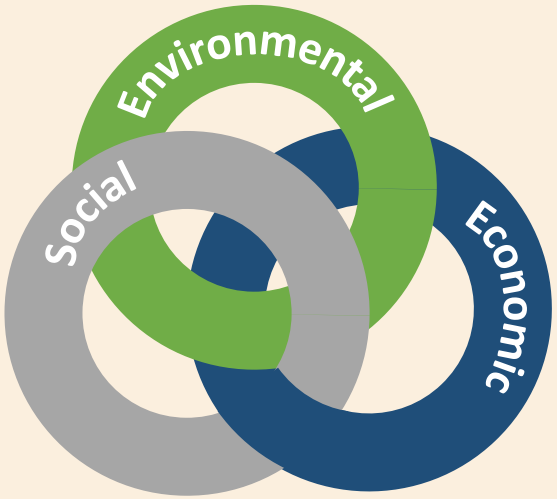
Purpose and Need	Segmented Park	Significant Impacts	Mitigation	Status
Safety issues	Laguna Atascosa National Refuge	Mortality of ocelot, jaguarundi, both listed endangered	4 under crossings, fencing, and cattle guards	Planned 2016-2017

Feasibility Study

Progress on Sustainability Factors

Preliminary factors identified by INVEST process:

- Long-term financial cost
- Traffic congestion
- Air quality
- Integration of non-roadway modes of transportation
- Resiliency of roadway
- Safety
- Natural environment, including ecological connectivity, scenic and recreational qualities
- Historic components



Continuity of Planning Process

Future goals identified by INVEST process:

- Improve continuity with transportation partners
- Overcome temporal disconnect between planning, construction

INVEST
ECONOMIC • SOCIAL • ENVIRONMENTAL

Feasibility Study Components

Feasibility study: should project move forward?

- Alignments (potential routes)
- Traffic
- Environmental factors
- Feasibility of project

Getty Images

Planning and Environment Linkages

Planning and Environment Linkages (PEL):

- Purpose and need
- Land use
- Population, employment
- Potential environmental effects, mitigation

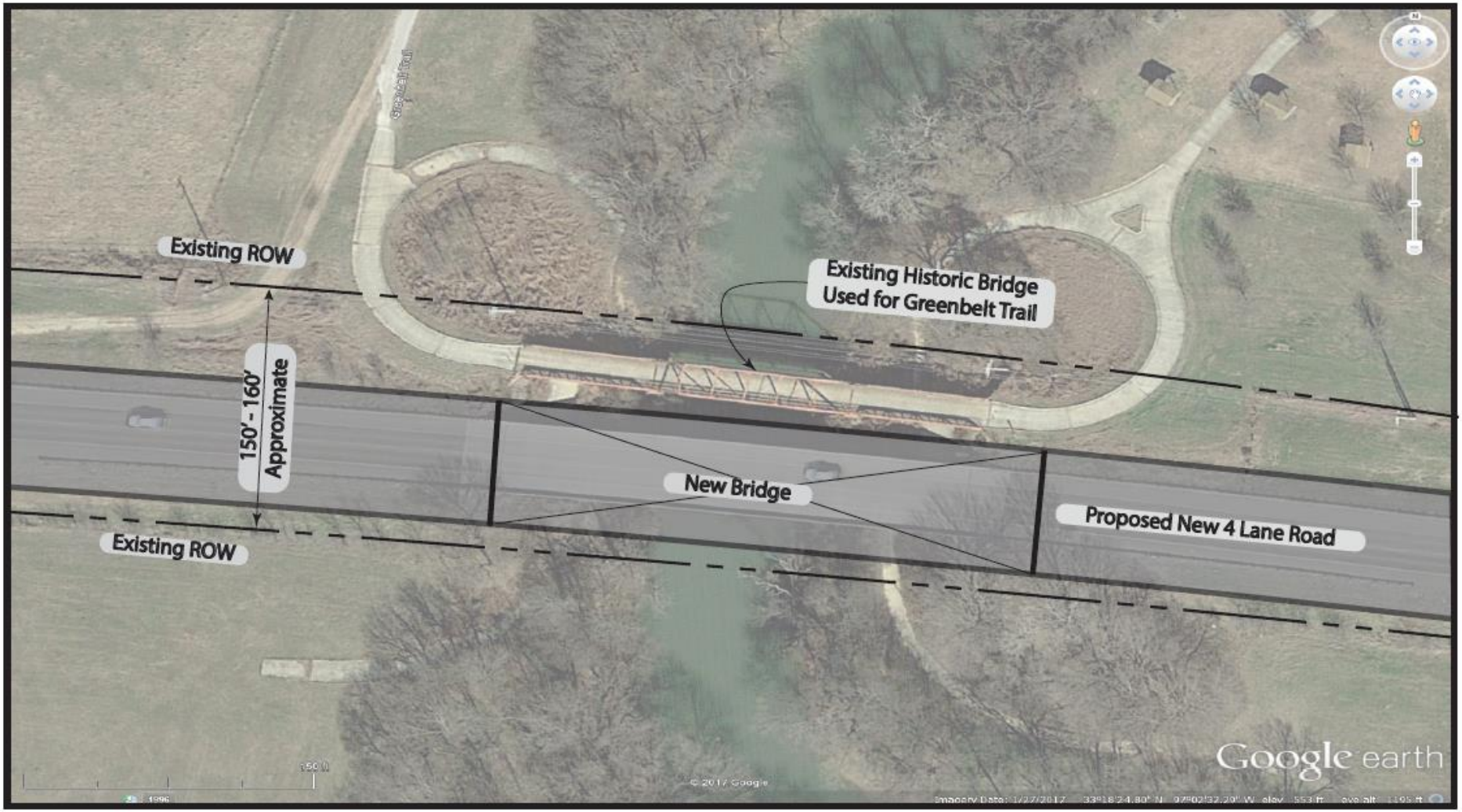
Feasibility Study Progress

Width of corridor in Greenbelt:

- Right-of-way width
- Plan view
- Cross section

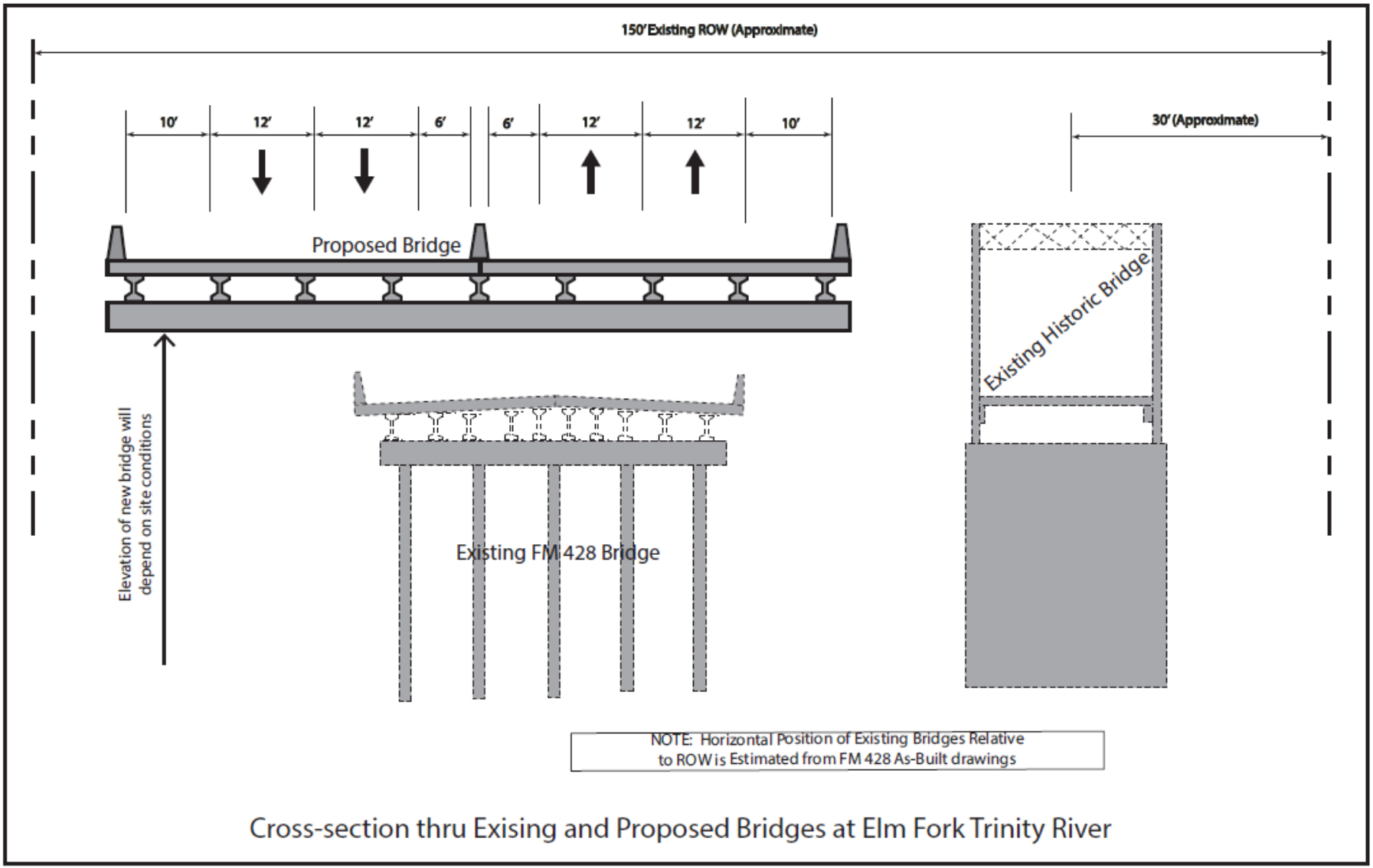
NCTCOG photo

Plan View



FM 428 at West Fork Trinity River

Cross Section

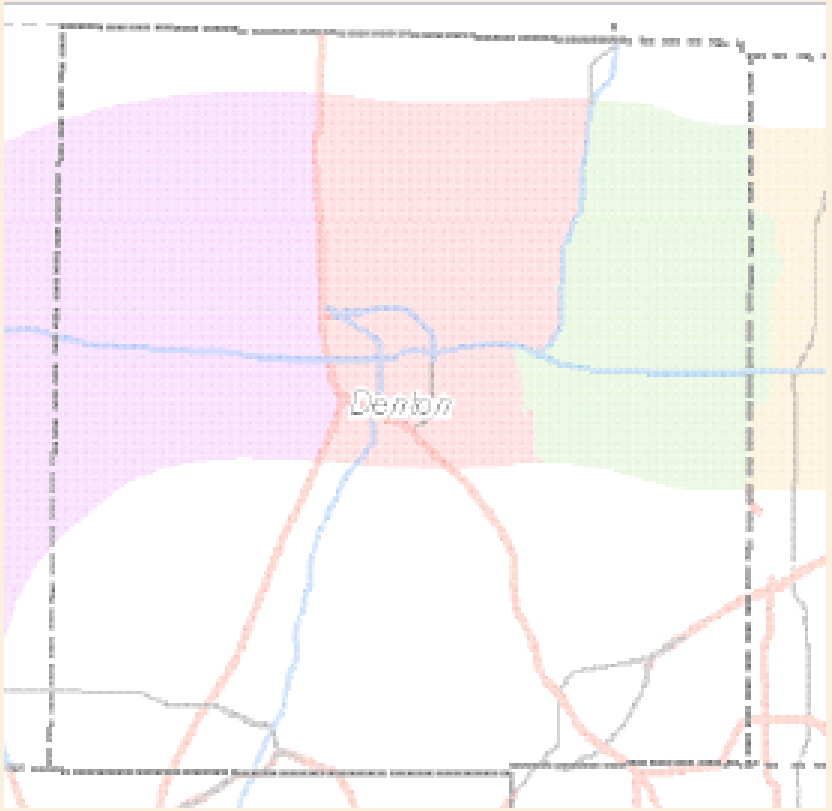


Cross-section thru Exising and Proposed Bridges at Elm Fork Trinity River

Denton County Meeting

Possible alignments
- Preferences
- Limitations

Plans for future development
- Sports complex
- City water facility



Denton County Meeting

Updated demographics

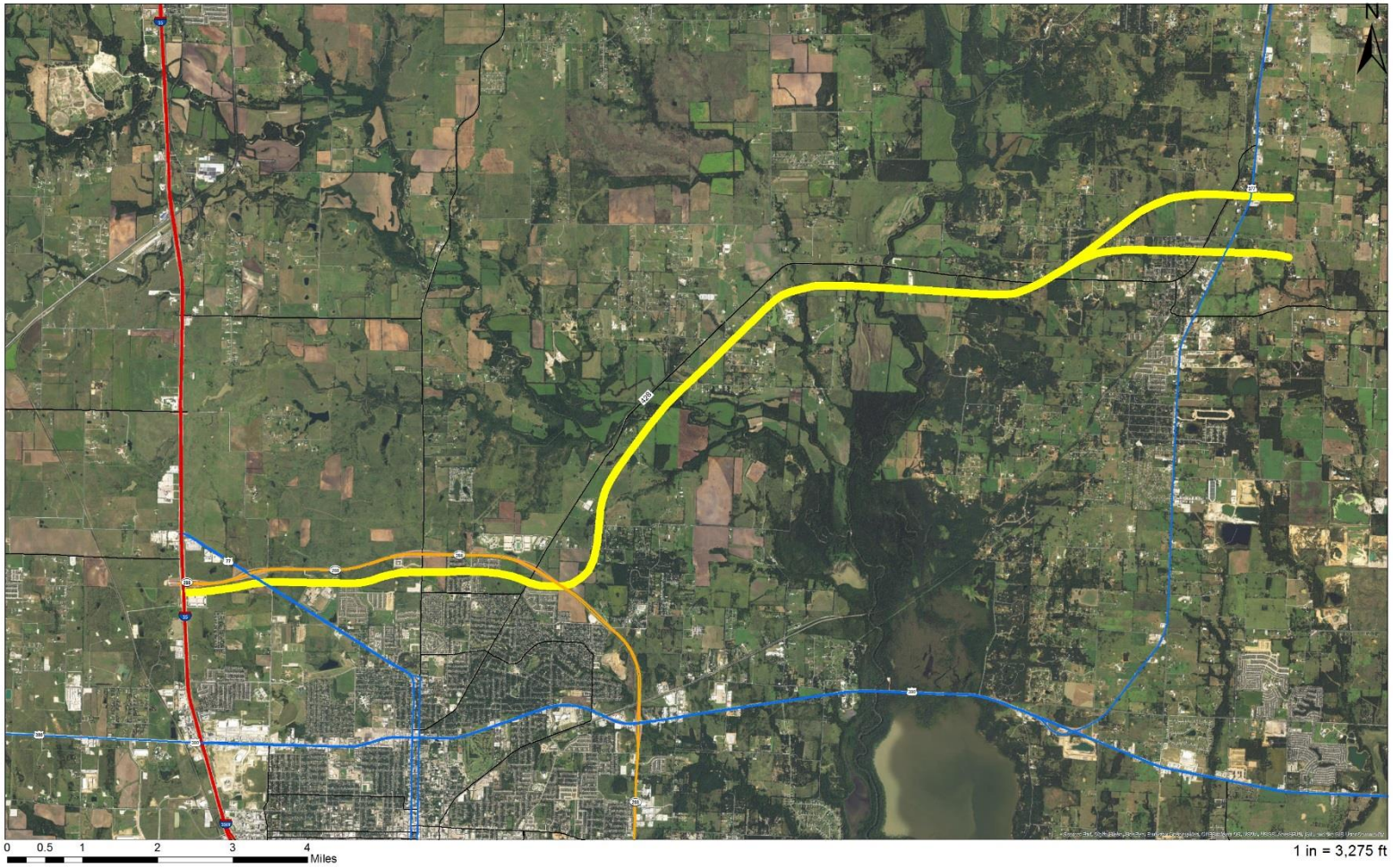
- Result of new development
- Impact on traffic demand

Connectivity

Land use

New traffic model

Potential Alignment



Updates to Environmental Data

Environmental is currently being updated from original 2011 Regional Outer Loop Study

Information is being updated if available or replaced if unavailable or new data is more refined.

Sections currently being updated include:

- Land Use, Farmland, Private Property, and Parks
- Aesthetics, Noise, Air Quality, Utilities, and Hazmat
- Demographics, Employment, Cultural Resources, and Community Effects

Next Steps for Feasibility Study

Meeting with technical committee

- Texas Department of Transportation
- Denton County
- City of Denton
- Consultant

Address access to park – engineering phase

Access to Park

Feedback from Stakeholders

Next Stakeholder Meeting

Tentatively June 2018:

- Final identification of sustainability, stewardship factors
- Outcome of meeting with technical committee
- Draft of feasibility study

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Greenbelt Stakeholder Meeting October 31, 2017

Meeting GOAL = To Identify and Prioritize Mitigation Actions for the Damages to the Greenbelt by the Widening of Hwy 428

Agenda

1. Lunch

2. Participants introductions

3. What are the potential damages caused by the 428 highway widening across the Greenbelt?

4. What ideas do each of you think would be appropriate to mitigate some of the damages to the Greenbelt caused by the highway project?

5. A discussion of how to prioritize the mitigation actions that are identified.

6. What are the top three mitigation actions?

7. Other Agenda Items?

Here are the Greenbelt stakeholders that attended the meeting: Chris True, Ken Dickson (moderator), Linda Moore, Roy Wilshire, Frank Abbott, Rick Martino, Richard Rogers, Tracy Mattern, Carol Nichols, Chuck Manning, Tim Beaty, and Janet Meyers.

Potential Mitigation Actions Identified by the Participants

1. Construction of Noise Buffers from the traffic at the Greenbelt Park

2. Trail Repair and Maintenance

3. Bridge construction on erosion problem sites on horse trail

4. Restrooms renovation

5. Erosion Control and Bank Stabilization on the trails

6. Landscaping with shade trees at Greenbelt Park

7. Expansion/Enhancements of 428 Greenbelt Park

8. Significantly increase the horse trailer parking area at 428 Trail head

9. Replace the steps at the canoe access with a ramp at Greenbelt Park

10. Provide night lighting at Greenbelt Park

11. Build a horse tunnel at 428

12. Build a bicycle lane and walking path parallel to the FM 428 expansion from the Greenbelt Park to Aubrey. This would give Aubrey residents access to the Greenbelt without increasing traffic.

13. Put a hard surface on the Greenbelt trail for the first 3 miles north of Highway 380. This would allow silt from flooding to be easily cleared away allowing that stretch of the trail to be opened using a Bobcat.

14. Develop a plan to remedy the flooding problem and silt problem at the start of the Greenbelt at the 380 access point to the Greenbelt. Goal is to keep the Greenbelt trail open for use. Currently flooding and silt cause frequent trail closure for extended periods.

15. Use the name "Greenbelt Parkway" for the 428 expansion between the Dallas North Tollway and Interstate I 35. This will signify the importance to our community of the Greenbelt and highlight the marquee status of the Greenbelt as an integral feature of the expansion.

Top Priority Mitigations

Each Stakeholder at the meeting was asked to identify their three (3) highest priorities for mitigation of damages to the Greenbelt by widening of Hwy 428 at the Greenbelt Park. They are:

1. This mitigation includes **expansion and enhancement of the Greenbelt Park at 428.**

This mitigation includes significantly increasing the size of the parking area (doubling or tripling) to provide for future park usage brought on by the road expansion and population growth. It also includes providing more parking for horse trailers, restroom renovation and enlargement, providing shade for users by landscaping with shade trees and covered tables, and providing night lighting and other amenities for users of all ages.

2. This mitigation includes **repair and enhancement of trails between FM 428 and HW 380** on the Greenbelt by upgrading them to all weather trail status. This mitigation also includes implementing erosion controls and bank stabilization techniques at the 428 bridge site and other Greenbelt trail sites needing erosion and stabilization. The trails between FM 428 and HW 380 are currently closed due to flooding conditions which occur regularly. Use of the Greenbelt will be greatly enhanced by reopening the trailhead on 380 which is the closest access point to Denton.

3. This mitigation requires **construction of noise buffers** from the increased traffic noise at the Greenbelt Park. We discussed the extensive planting and cultivation of trees strategically placed to dampen noise at the 428 entrance site. Preferably planting would take place as soon as plans are finalized so growth could start as soon as possible.

MEETING SUMMARY

Denton Greenbelt Stakeholders Meeting
Rancho de la Roca, 2459 Blackjack Road West, Aubrey, Texas
1 pm, Tuesday, December 5, 2017

The Denton Greenbelt Stakeholders met on Tuesday, December 5, 2017 at 1 pm at Rancho de la Roca in Aubrey, Texas. The following individuals were present:

Frank Abbott, Kimley-Horn
Blake Alldredge, Upper Trinity Regional Water District (UTRWD)
Sue Allison, Allison Engineering
Katherine Barnett, City of Denton
Tim Beaty, Greenbelt Alliance
Glenna Butler, Citizen
Ken Dickson, Greenbelt Alliance
Rob Jordan, US Army Corps of Engineers (USACE)
Mark Kaiser, City of Aubrey
Kevin Lee, The Spinistry
Rick Martino, Greenbelt Alliance
Jeff Miller, Aubrey City Council
Sid Puder, US Fish & Wildlife
Richard Rogers, Greenbelt Alliance
Aaron Shine, USACE
Ben A. Stephenson, City of Dallas
Marty Underwood, USACE
Roy Wilshire, Kimley-Horn

North Central Texas Council of Governments (NCTCOG) staff:
Carli Baylor
Michael Bridges
Nathan Drozd
Amanda Long-Rodriguez
Patricia Rohmer
Kate Zielke

Presentation
Kate Zielke presented a summary of NCTCOG's recent stakeholder outreach efforts and coordination with the USACE and the Texas Parks & Wildlife Department (TPWD). Preliminary factors identified by NCTCOG's use of the INVEST sustainability tool include long-term financial costs, traffic congestion, air quality, safety, natural environment, historic components, and the integration of non-roadway modes of transportation.

Per a request from stakeholders at the June meeting, Amanda Long-Rodriguez presented case studies of parks and natural areas segmented by a roadway. The projects included US 73 in California, US 93 in Montana, SR 84/IH 75 in Florida, IH 270/US 15 in Maryland, and SH 100 in Cameron County, Texas.

Kate Zielke and Patricia Rohmer presented an update on the feasibility study for the Greenbelt project. Kate stated future goals identified by the INVEST process include improving continuity with transportation partners and overcoming the disconnect between planning and construction. Patricia said the feasibility study will address preservation of the historic bridge. Park access will be addressed during the engineering phase of the project. She showed images of plans for the new roadway that would run south of the bridge but within the existing right-of-way (ROW). She also reported that a recent planning meeting with Denton County resulted in a new preferred alignment connecting to Loop 288. Environmental data is currently being updated from the original 2011 Regional Outer Loop Study. Next steps include a technical meeting with the Texas Department of Transportation (TxDOT), city of Denton, Denton County, and consultants.

Stakeholders' Priorities

Stakeholders discussed their concerns and requests:

Bridges: A meeting attendee asked whether it might be possible to move the historic bridge. NCTCOG staff explained that while it would be technically feasible, it would be very difficult and might not even be necessary if future traffic volumes don't justify expanding the roadway beyond four lanes.

Park access: Meeting attendees asked how the facility would provide access to the park, as this location is the preferred access point for equestrians. NCTCOG staff replied there would be four lanes with a divided median and turn lanes. Meeting attendees expressed concerns that the conservation easement prevents the construction of ramps adequate for horse trailers to safely enter or exit the park. They also observed that the parking lot is near capacity for trailers and may need to be expanded. NCTCOG staff responded that multiple options exist for creating access to the east or west of the easement. In response to a suggestion of routing traffic under the bridge, NCTCOG staff noted that it would be necessary to acquire additional ROW, which would again be affected by the conservation easement. As the parking lot is on federal land leased to the state, TxDOT is not responsible for building roads within the park. TxDOT engineers will complete a more thorough study of park access than can be included in this preliminary feasibility study. NCTCOG will share stakeholder feedback about access issues with TxDOT through a recommendations chapter in the feasibility study and through the agency's regular coordination meetings with TxDOT. One meeting attendee inquired whether park access is affected by flood events. Stakeholders responded that flooding impacts the east side of the park.

ROW width: One meeting attendee commented that the planned 10-foot shoulder is not wide enough for road bicyclists. NCTCOG staff explained that the ROW cannot be widened due to the conservation easement. They suggested rerouting the bike route over the historic bridge, and then have the route return to the roadway shoulder beyond the point where the conservation easement ends. When asked if the easement could be narrowed, NCTCOG staff replied that in the past, USACE staff have communicated that the easement can only be modified through an act of Congress.

NCTCOG staff were asked whether the facility would have six lanes but drop down to four lanes within the greenbelt. They responded that project construction would not begin for another 15 or 20 years, and traffic conditions at that time might not warrant more than four lanes. If studies show that traffic volumes increase greatly in the coming decades, it might be necessary to negotiate expansion of the ROW with the USACE. One attendee asked whether the planned survey of the ROW might yield results

that would alter the roadway design, and NCTCOG staff replied that they did not expect the survey to reveal major differences in the ROW.

Impact Mitigation: One attendee suggested proactive tree planting, so that the trees will be full grown and act as a noise buffer when the roadway is built. NCTCOG staff replied that the required depth (200 feet) is not available for a vegetative buffer to reduce noise, so TxDOT could not use trees as sound mitigation. TPWD can plant trees but will not be able to use them to satisfy federal noise mitigation requirements.

Two meeting attendees commented on the need to consider and accommodate wildlife traveling through the greenbelt. NCTCOG staff said that bridges could be designed to meet those needs; the design details will be worked out later in the engineering phase of the project. They also requested that interested community members share any information they have about wildlife pathways in the greenbelt. When asked whether mitigation could be done outside of the road area, NCTCOG staff related that TxDOT approves off-site mitigation on a case-by-case basis. To help preserve the existing greenbelt, meeting attendees suggested keeping the trail between US 380 and FM 428 open and raising public awareness by incorporating "greenbelt" into the name of the new roadway.

Bicycle and Pedestrian Facilities: In response to a suggestion of building a bike or foot path to Aubrey, NCTCOG staff said that TxDOT facilities do require bicycle and pedestrian access, and federal funds could be used for construction. However, this would be evaluated more closely in a later phase.

Other Alignment Issues: A meeting attendee asked why Denton County altered the facility's preferred alignment to connect with Loop 288. NCTCOG staff replied that the county made the change to accommodate other development plans in the area. When asked if any alternative alignments would be studied, NCTCOG staff responded that they would.

One meeting attendee suggested moving the existing ROW to accommodate a frontage road, but NCTCOG staff replied that doing so would infringe upon the existing conservation easements. The roadway design is restricted to the land already owned by TxDOT.

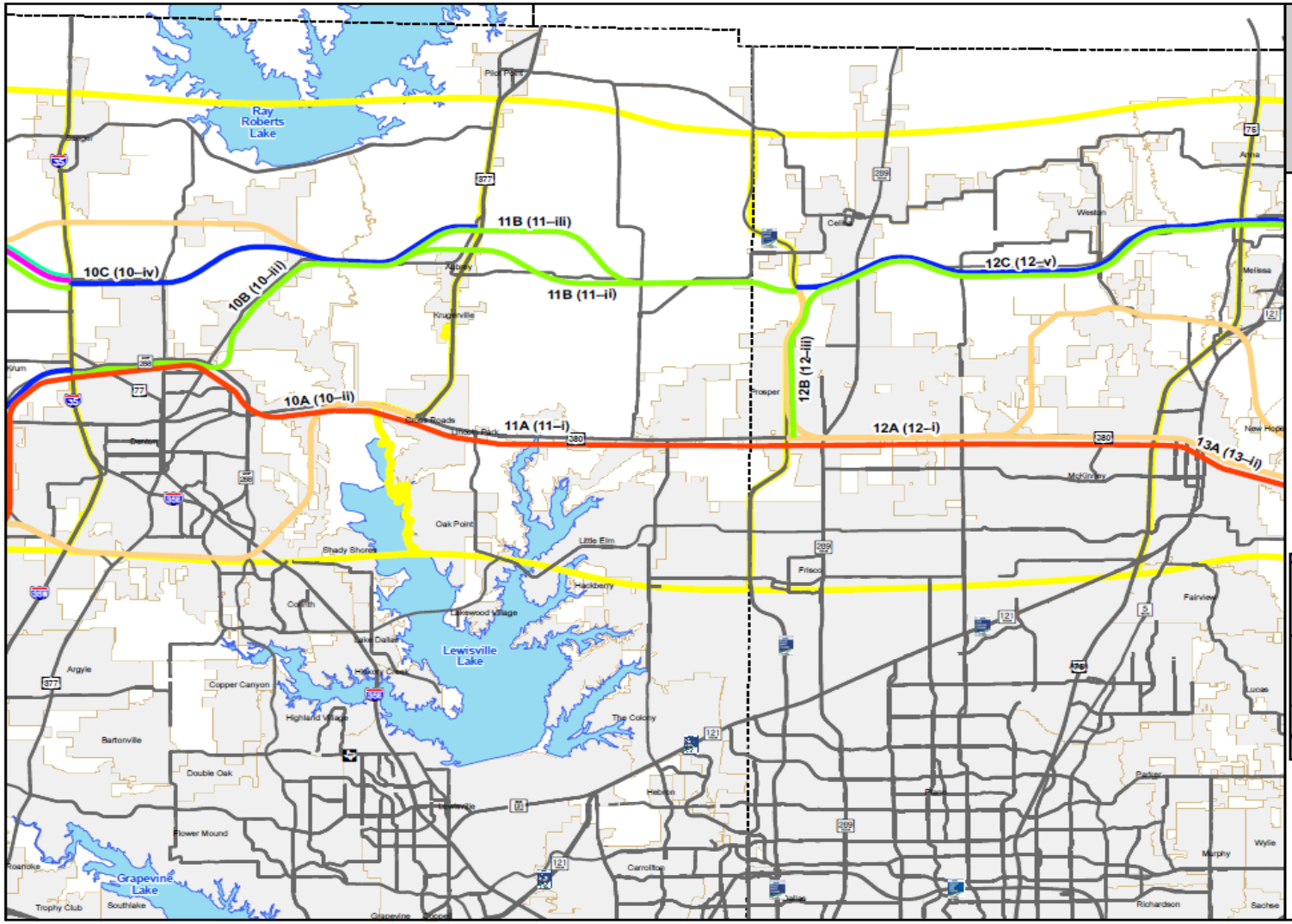
NCTCOG staff were asked whether an alternative existed that did not cross the park, to which they replied that the geographic constraints posed by US 380 and the dam made it necessary to cross the greenbelt.

One meeting attendee commented that there is a need to address congestion where the road meets US 377. NCTCOG staff replied that traffic will be considered in the feasibility study and in consultation with local and state government partners. The details will be designed later, in the engineering phase of the project.

Denton Greenbelt Corridor Feasibility Study

Transportation Partners Meeting

October 22, 2018



Phase 2 Modeling Path Centerlines IH 35/IH 35W to US 75 Figure III-45

Regional Outer Loop Corridor Feasibility Report

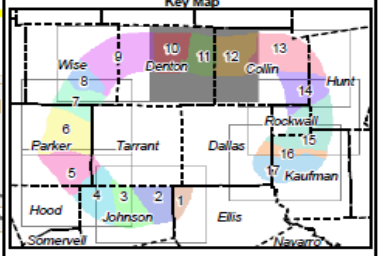
Legend

- Modeled Path A
- Modeled Path B
- Modeled Path C
- Modeled Path D
- Modeled Path E
- Eliminated Path
- Loop 9 Southeast DEIS Alternatives
- Roadway
- City/Town Limits
- Subarea Limits
- County Limits

Labels: Phase 2 Path (Preliminary Path)

Note: Modeled path lines represent path centerlines and do not reflect 1/2 to one mile path buffers.

Key Map



0 1 2 3 6

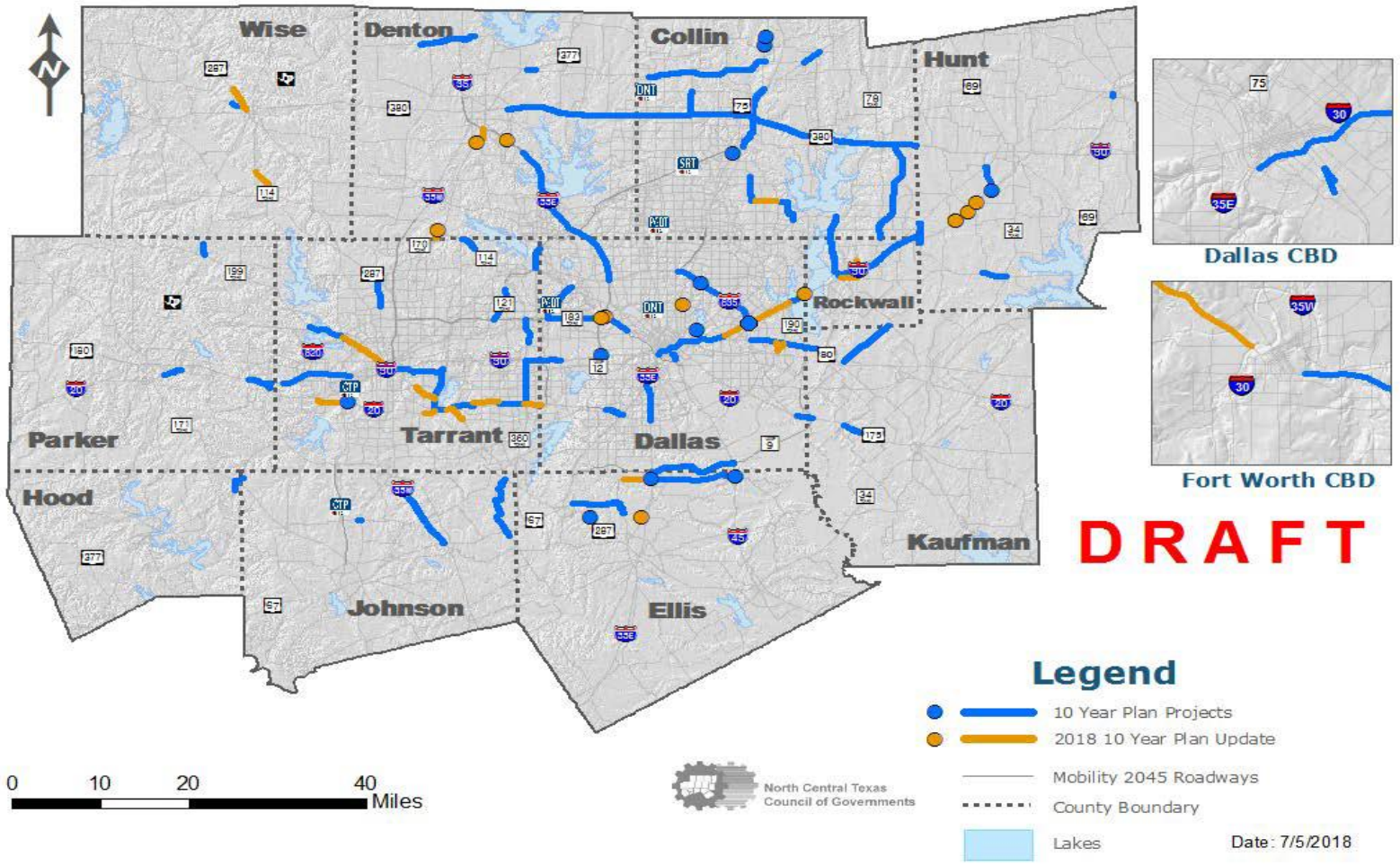
Miles

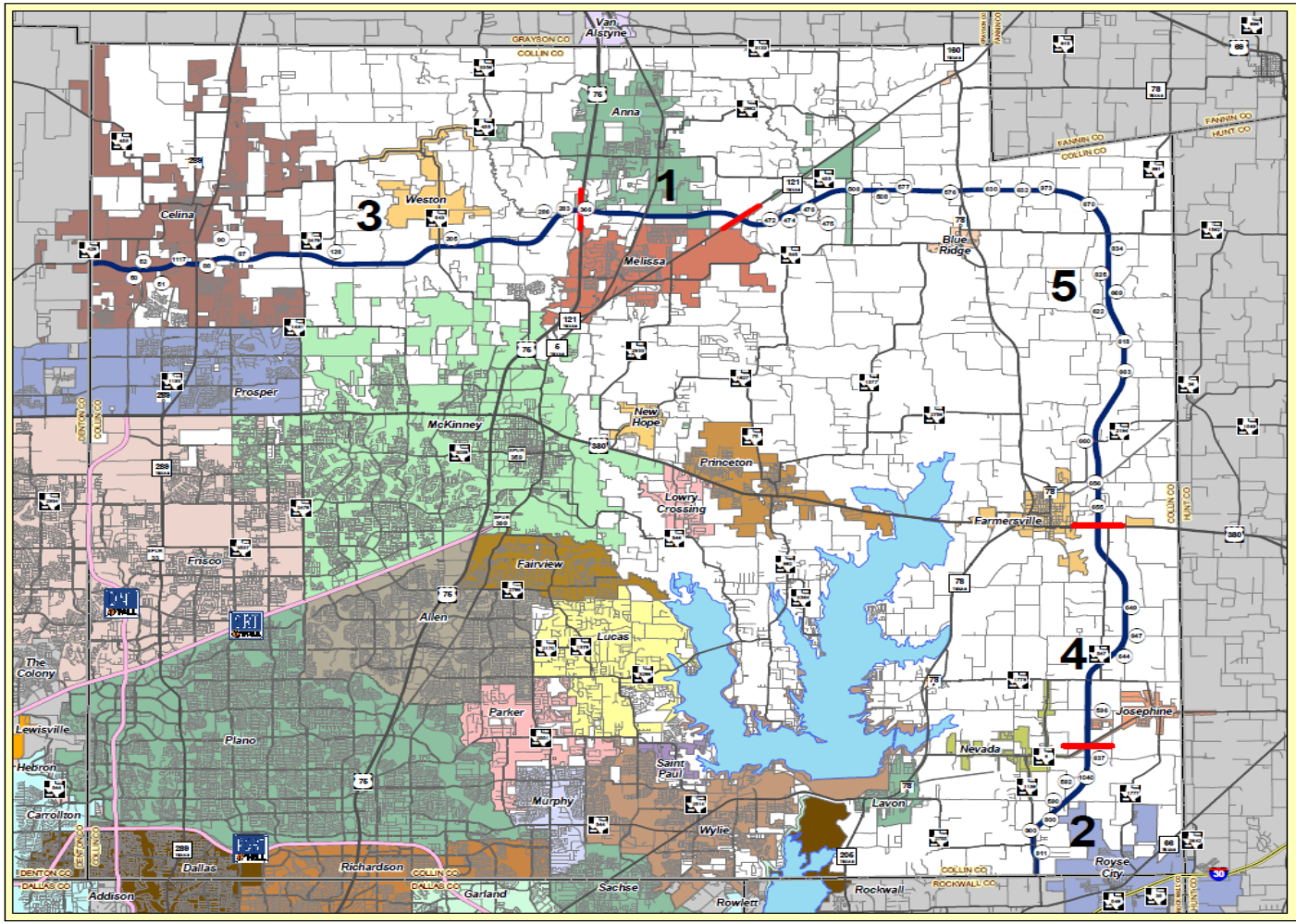
N W E S

North Central Texas Council of Governments

Dallas-Fort Worth Regional 10 Year Plan Projects

FY 2017 - FY 2028





Collin County Outer Loop

Legend

Numbered Segments

1	US 75 - SH 121
2	FM 6 - Rockwall Co.
3	DNT - US 75
4	US 380 - FM 6
5	SH 121 - US 380

0 2 4 6 8

Miles

N
W E
S

Source data compiled from GIS Database and the Engineering Department.

This map is a graphic representation of Collin County and the Outer Loop Study and should only be used for illustrative purposes. In no way should this map be used to settle any boundary disputes or locational conflict.

January 11, 2018

DENTON COUNTY

Denton County Thoroughfare Plan

Approved: April 18, 2017

LEGEND

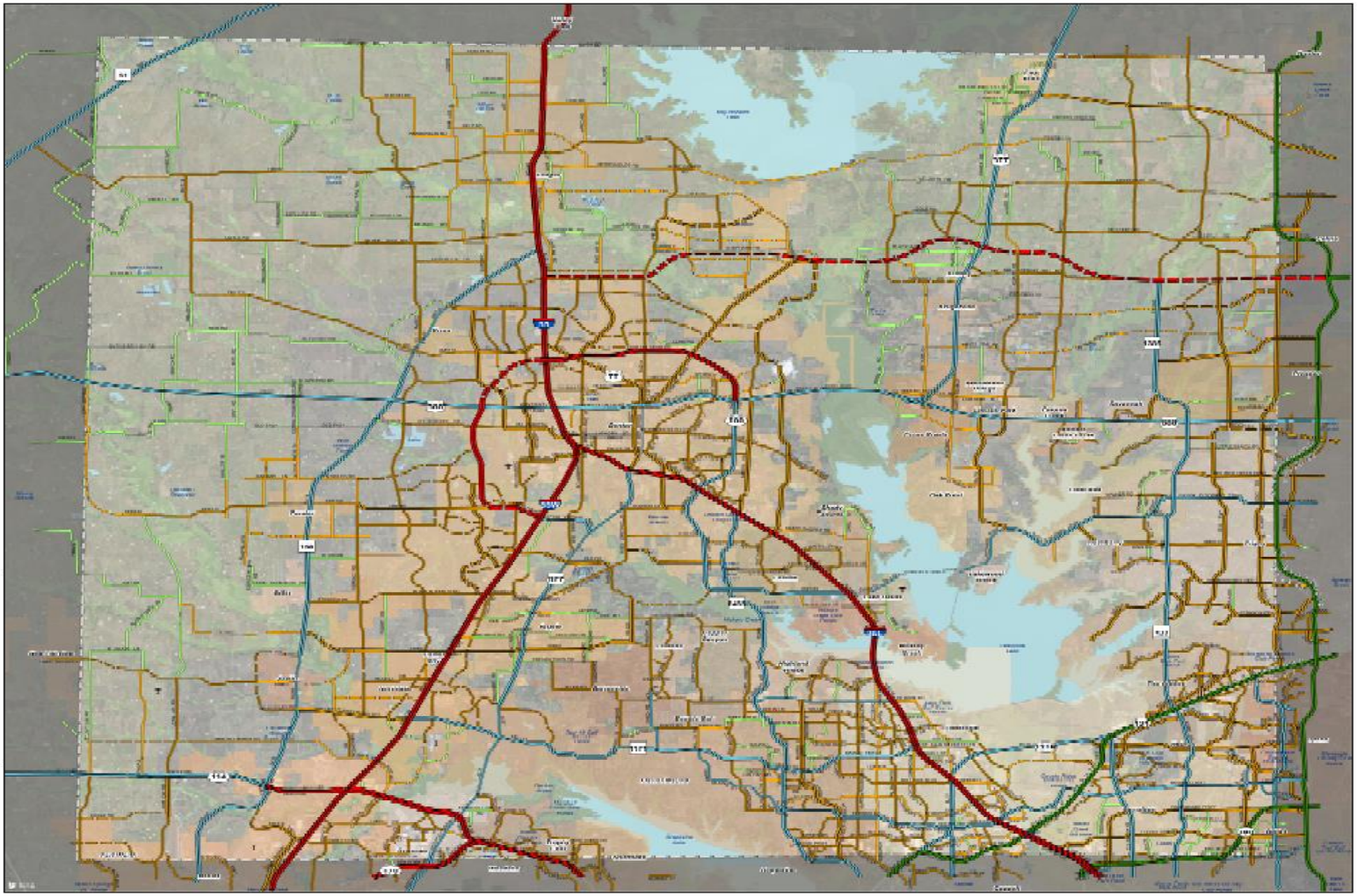
Road Types

- Freeway/Highway
- Toll Road
- Principal Arterial 6 Lane Divided (120' to 160' ROW)
- Principal Arterial 4 Lane Divided (100' to 120' ROW
- Major Arterial 6 Lane Divided (120' to 140' ROW)
- Major Arterial 4 Lane Divided (100' to 120' ROW)
- Minor Arterial 4 Lane Undivided / 3 Lane (80' to 100' ROW)
- One-way Couplet (Lanes and ROW vary)
- Minor Arterial 2 Lane (70' ROW)
- County Line
- Airport
- Rail Line
- Lakes
- 1-Percent Flood Risk Zones (FEMA)

Relationship to the Region

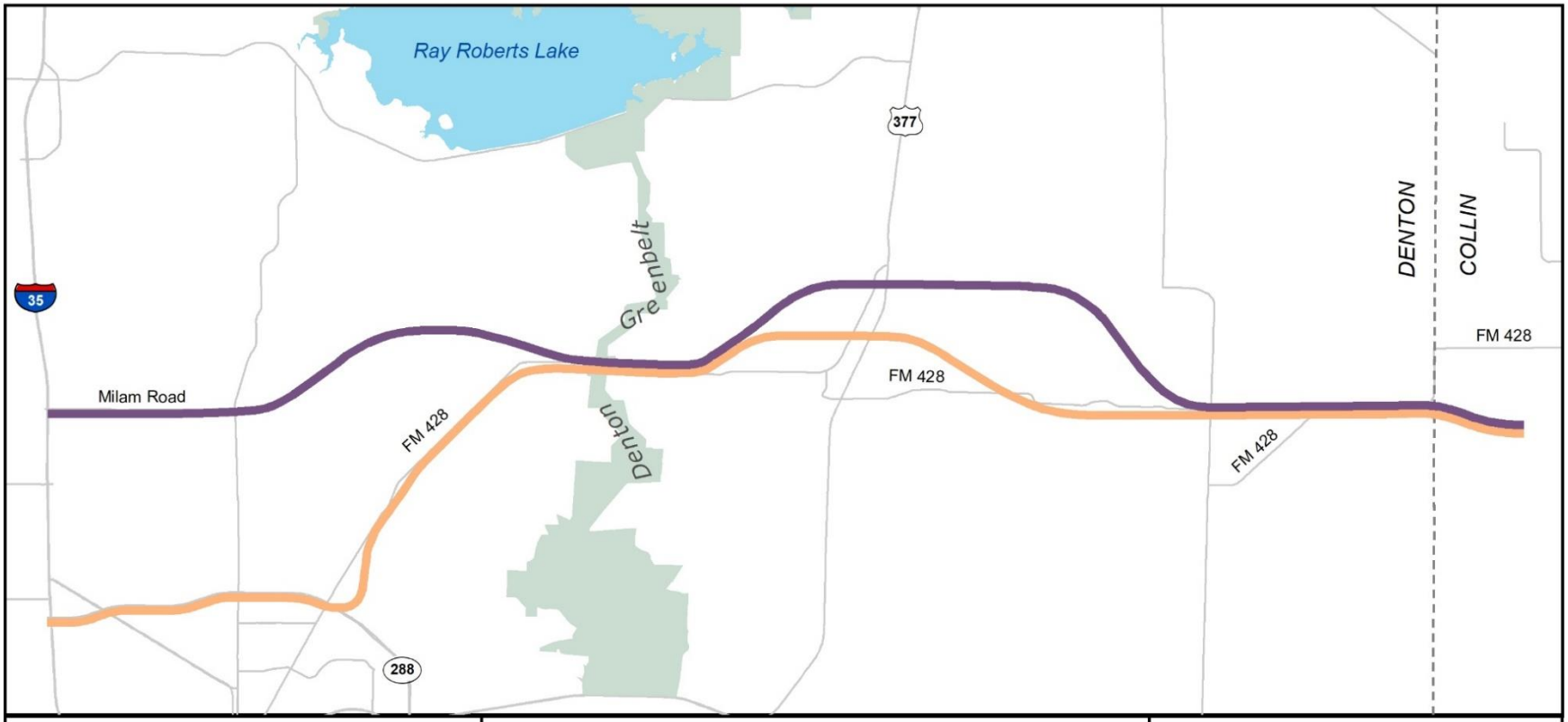
0 0.5 1 2 3 4 Miles

FREESE NICHOLS

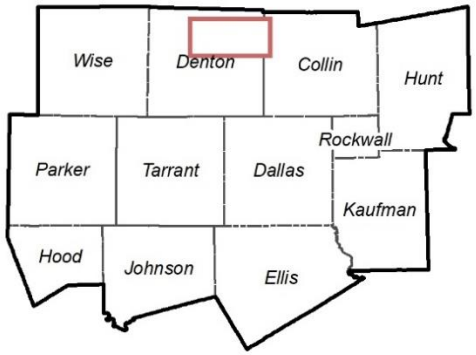


Proposed Alignments

Denton Greenbelt Corridor Feasibility Study



Denton Greenbelt Corridor Location



Proposed Alignments

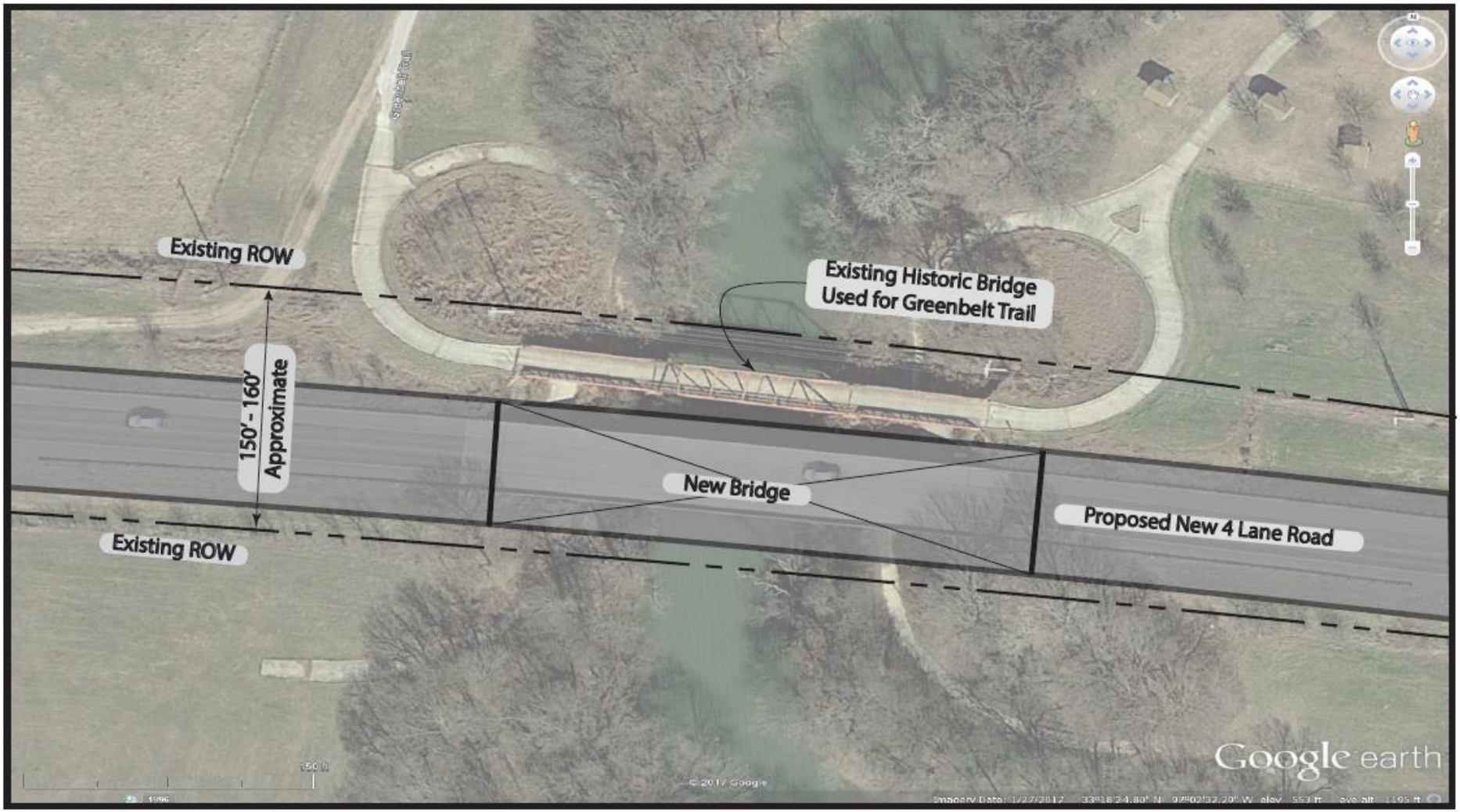
- Alignment 1
- Alignment 2
- State Parks
- Existing Roads

0 1 2 3 Miles

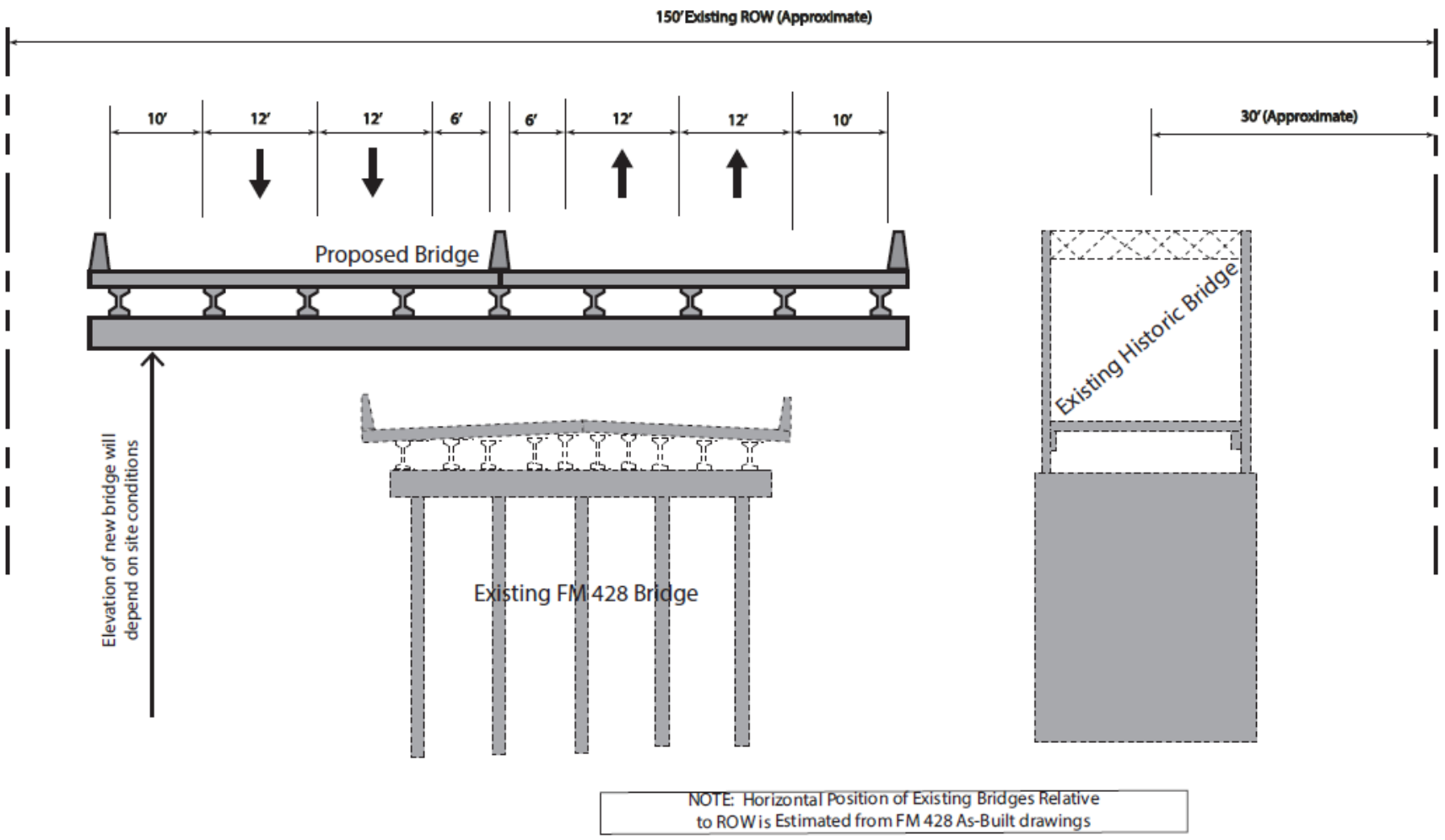
N W E S

North Central Texas Council of Governments

NCTCOG, 2018



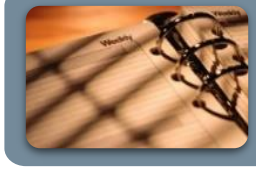
FM 428 at West Fork Trinity River



Cross-section thru Exising and Proposed Bridges at Elm Fork Trinity River

What is the Metropolitan Transportation Plan?

Represents a Blueprint for the Region's Multimodal Transportation System



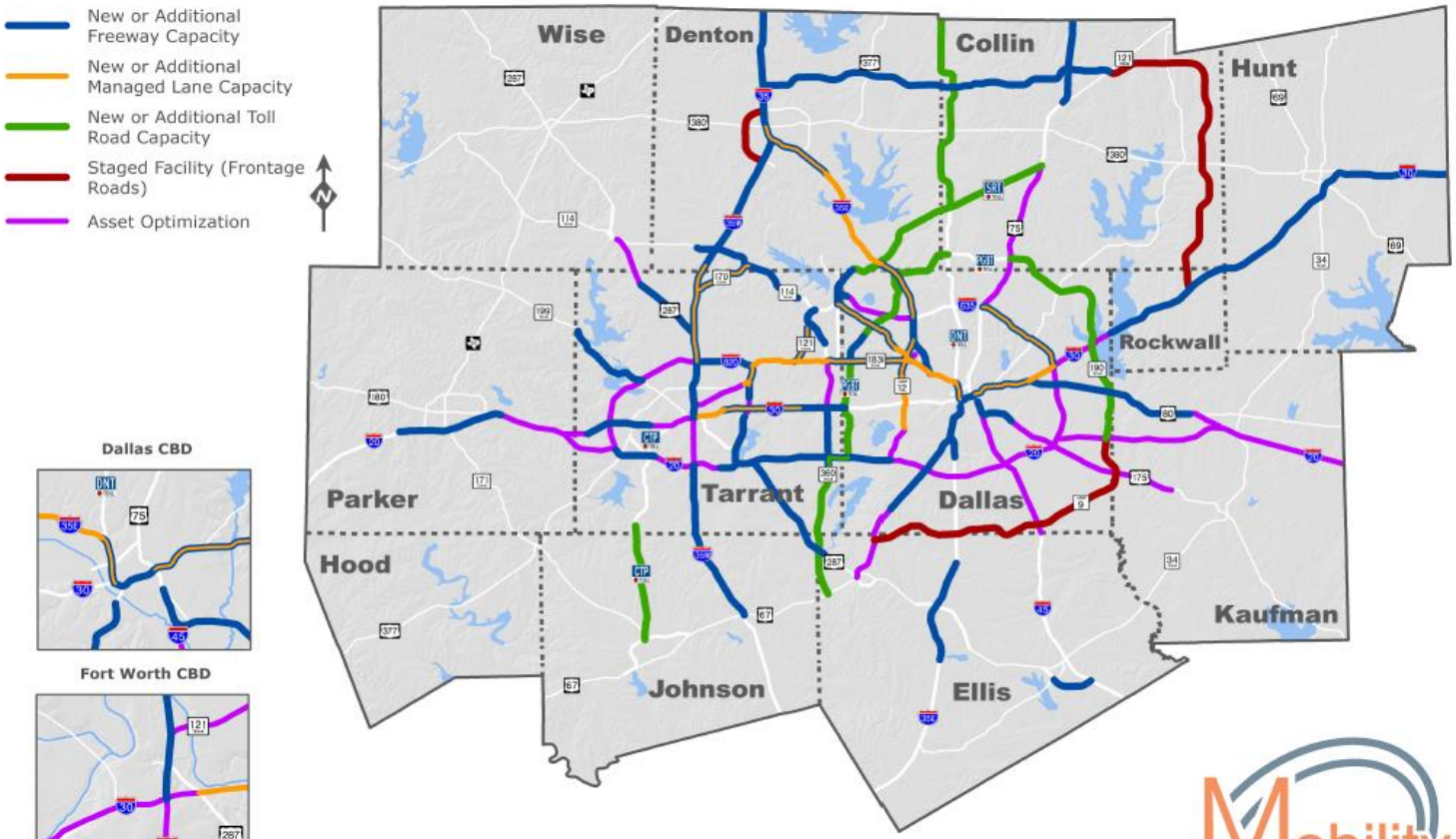
Covers at Least a 20-Year Timeframe

Responds to Goals

Identifies Policies, Programs, and Projects for Continued Development

Guides the Expenditure of Federal and State Funds

Major Roadway Recommendations



North Central Texas Council of Governments

June 2018

Facility recommendations indicate transportation need. Corridor-specific alignment, design, and operational characteristics will be determined through ongoing project development.

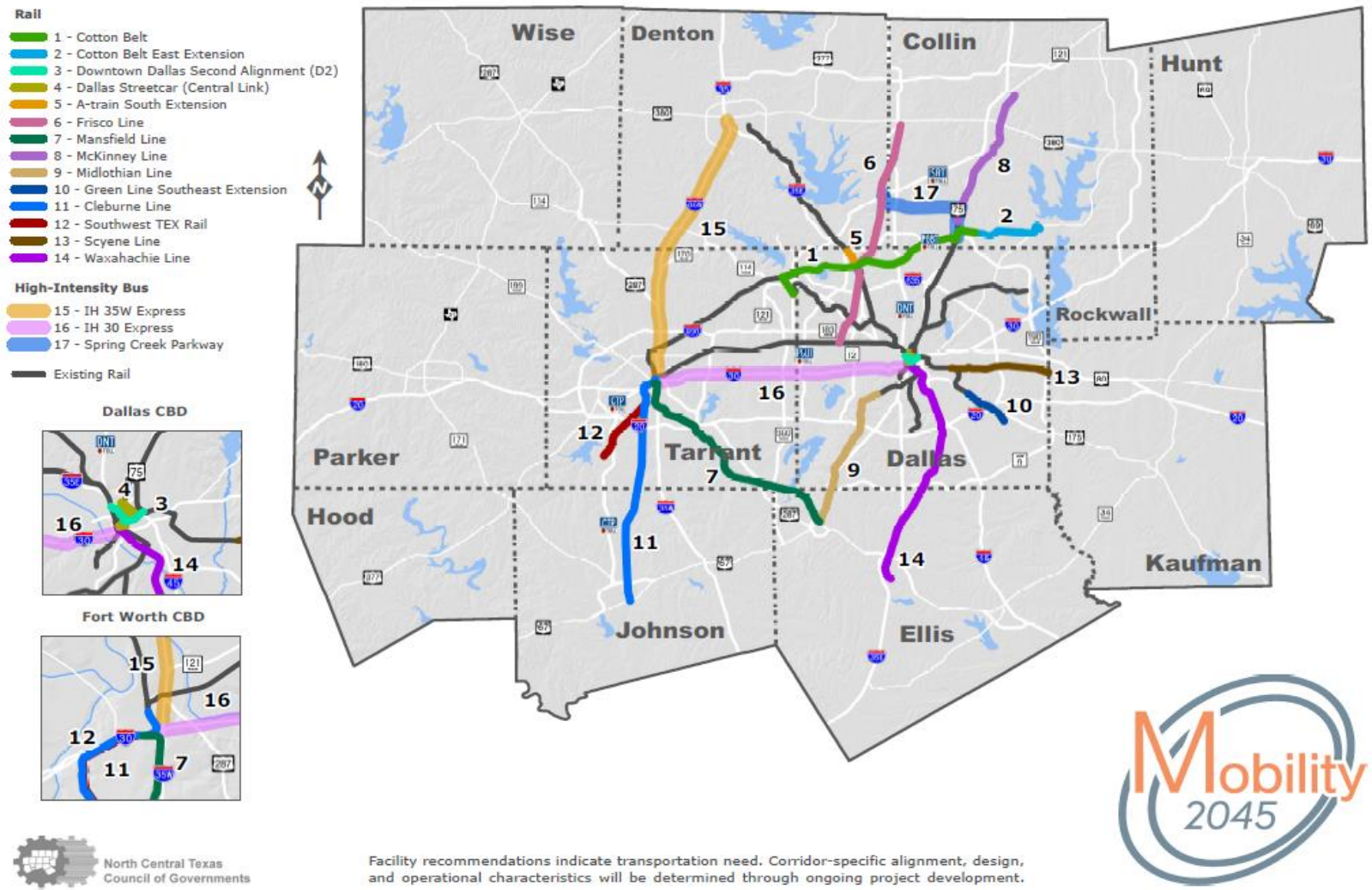
Mobility 2045

2045 Level of Service Analysis

Dallas District

ID	Facility	From	To	Avg Daily Vol	Avg Pk Vol/Ln	Avg Pk Cap/Ln	Pk Hr LOS	Lanes	Lanes Warranted
COLLIN COUNTY LOOP (NORTH)									
110.20.1	Collin County Loop (North)	Dallas North Tollway	US 75	68,700	2,032	2,300	E	4 / 8	6
110.30.1	Collin County Loop (North)	US 75	SRT (SH 121)	46,300	1,368	2,167	C+	4 / 6	4
DALLAS NORTH TOLLWAY									
21.10.1	Dallas North Tollway	FM 121 (Grayson County Line)	FM 428	1,600	28	2,071	C+	6 / 8	2
21.10.2	Dallas North Tollway	FM 428	US 380	28,600	828	2,229	C+	6 / 8	4
21.10.4	Dallas North Tollway	Rockhill Road	SRT (SH 121)	122,600	2,676	2,388	F	6 / 10	10
21.20.1	Dallas North Tollway	SH 121	Parker Road	199,000	3,726	2,263	F	6 / 10	14
21.20.2	Dallas North Tollway	Parker Road	PGBT	159,300	3,371	2,371	F	6 / 10	12
21.20.3	Dallas North Tollway	PGBT	Beltline Road	175,400	3,225	2,213	F	6 / 8	12
21.20.4	Dallas North Tollway	Beltline Road	Royal Lane	158,600	3,229	2,114	F	6 / 8	10
21.20.5	Dallas North Tollway	Royal Lane	Mockingbird Lane	140,600	3,601	2,300	F	6	10
21.20.6	Dallas North Tollway	Mockingbird Lane	IH 35E	119,700	3,265	2,300	F	6	10
DENTON COUNTY LOOP (NORTH)									
110.10.1	Denton County Loop (North)	IH 35	Dallas North Tollway	69,300	1,658	2,071	D	4 / 8	6
IH 20									
30.70.2	IH 20	Great Southwest Parkway (Tarrant County Line)	PGBT WE (SH 161)	272,500	3,640	2,140	F	8 / 12	18
30.80.1	IH 20	PGBT WE (SH 161)	Robinson Road	235,900	3,949	2,300	F	8	14
30.80.2	IH 20	Robinson Road	FM 1382	281,200	3,491	2,155	F	10 / 12	18
30.80.3	IH 20	FM 1382	Spur 408	274,100	3,860	2,420	F	10 / 12	16
30.80.4	IH 20	Spur 408	Cedar Ridge Drive	195,800	3,178	2,189	F	6 / 10	12
30.80.5	IH 20	Cedar Ridge Drive	US 67	202,300	3,201	2,300	F	8 / 10	14
30.80.6	IH 20	US 67	Polk Street	192,800	3,044	2,078	F	8 / 10	12
30.80.7	IH 20	Polk Street	IH 35E	192,900	3,156	2,200	F	8 / 12	16
30.80.8	IH 20	IH 35E	SH 342	181,100	2,889	2,233	F	8 / 10	12
30.80.9	IH 20	SH 342	Bonnie View Road	194,600	3,067	2,300	F	8 / 10	14
30.80.10	IH 20	Bonnie View Road	IH 45	204,700	3,245	2,389	F	8 / 10	14

Transit Corridor Projects



North Central Texas Council of Governments

June 2018

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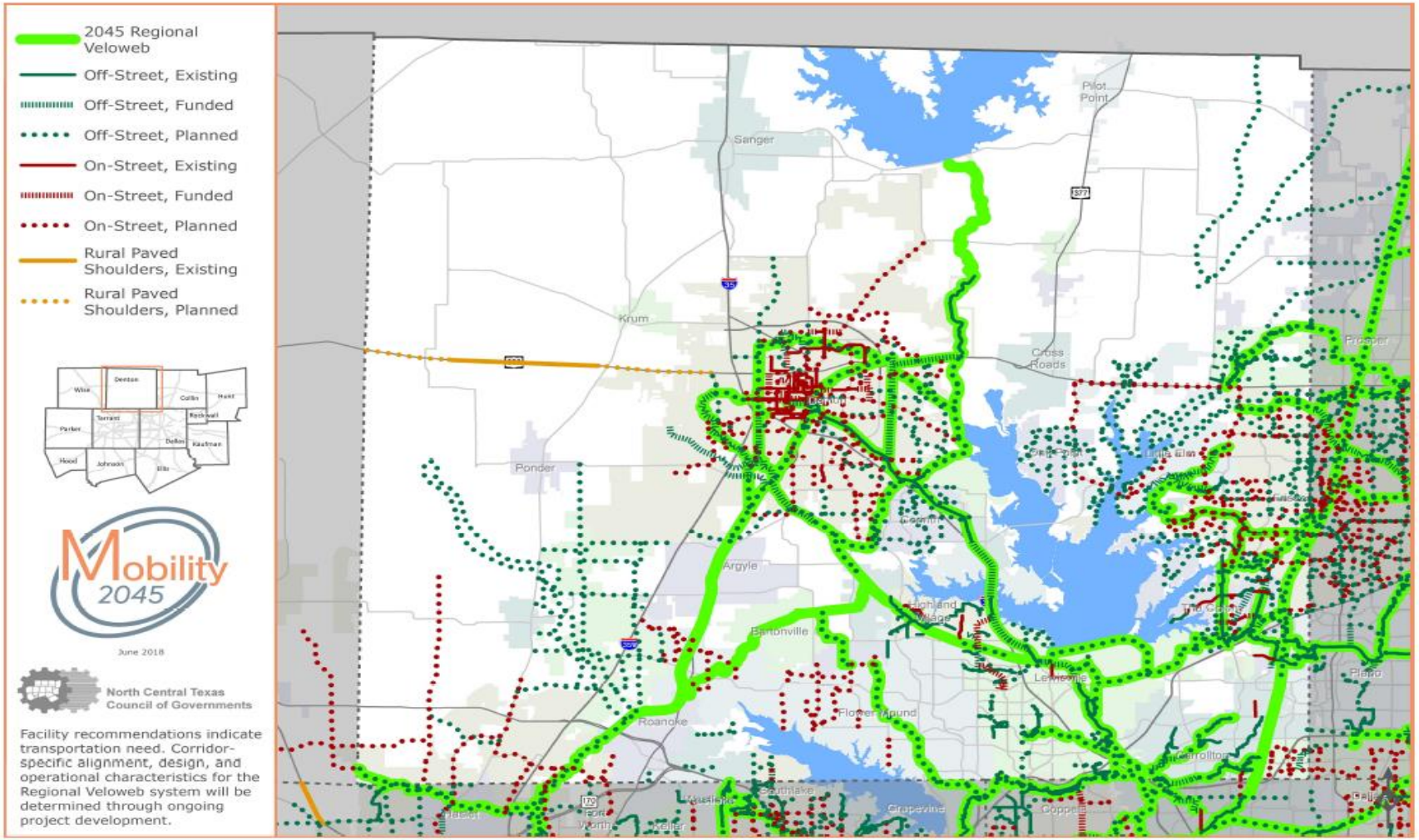
Mobility 2045

Bikeway Network in Denton County



MEETING SUMMARY

Transportation Partners Meeting
North Central Texas Council of Governments
616 Six Flags Drive, Centerpoint Two, Arlington, Texas
2:30 pm, Monday, October 22, 2018

The North Central Texas Council of Governments (NCTCOG) met with transportation partners on Monday, October 22, 2018 at 2:30 at NCTCOG's offices in Arlington, Texas. The following individuals were present:

Pete Anaya, Town of Prosper
Tracy Beck, City of Denton
Ann Boulden, Denton County Transportation Authority (DCTA)

NCTCOG staff:
Berrien Barks
James Dam
Brian Flood
Mike Johnson
Kevin Kokes
Amanda Long-Rodriguez
Jeff Neal
Patricia Rohmer
Sarah Wraight
Jing Xu
Kate Zielke

Presentation
Jeff Neal provided some context for the Denton Greenbelt Corridor Feasibility Study by noting its origins in the 2011 Regional Outer Loop Corridor Feasibility Study, and describing the planning and staged construction work underway on Collin County's Outer Loop. The US Army Corps of Engineers has stipulated that there should be no new crossings of the Greenbelt. Of the three existing crossings, FM 455 cannot be expanded and the proposed expansion of US 380 may not be sufficient to handle future traffic volumes. This study proposes utilizing the existing FM 428 crossing to build a 4-lane facility. Jeff noted that it's unclear whether additional lanes would be needed in future. Facility expansion would be challenging because of the Greenbelt's conservation easements and the presence of a historic bridge in the corridor.

Kate Zielke said that a Federal Highways Administration (FHWA) grant has supported NCTCOG staff in engaging stakeholders and considering a suite of sustainability elements that were adapted from FHWA's Infrastructure Voluntary Evaluation Sustainability Tool, known as INVEST. Brian Flood reported that the Denton Greenbelt corridor is listed as a 6-lane freeway in the Metropolitan Transportation Plan (MTP), which matches traffic volume projections and the Denton County Thoroughfare Plan. Transit options for this corridor will require further study.

Discussion

Ann Boulden noted that DCTA had planned for transit to be integrated either into the Denton Greenbelt corridor or US 380. She asked whether the Denton Greenbelt corridor could include a dedicated express bus lane, possibly to be converted to rail in future. Jeff responded that transit should be considered in this feasibility study. The main obstacle would be the conservation easements at the Greenbelt crossing; there are only 150 feet of right-of-way (ROW). The meeting attendees discussed potentially working with Union Pacific to use existing freight lines for passenger rail. Pete Anaya and Ann expressed interest in vertically stacking transportation facilities in the Greenbelt crossing. Jeff observed that it might be possible, but visual and other environmental impacts would need to be evaluated. Also, interchanges would have to be built on either side of the Greenbelt. Kate explained that the easement crossing may be between 400 and 600 feet long (east-west). Tracy Beck asked whether it might be possible to tunnel under the easement.

Tracy stated that the city of Denton prefers Alignment 2 (following Milam Road to IH 35). Alignment 1 (routing to Loop 288 via FM 428) does not meet the city's needs. Ann commented that there is also opposition to routing the 380 expressway through the city.

Kevin Kokes commented that the MTP doesn't call for any east-west bicycle/pedestrian trails in northern Denton County. He asked whether this project could incorporate a Veloweb path following the highway. Ann expressed her support, adding that the trail could cross the historic bridge within the Greenbelt (already used by bicyclists and pedestrians as part of the park trail system). Patricia Rohmer noted that the city of Aubrey is also interested in bicycle/pedestrian trails in the corridor, and she stated that NCTCOG can include an east-west bicycle/pedestrian trail in the scope of the project.

Tracy observed that moving a historic bridge is a lengthy and complicated process regardless of the relocation distance. She suggested maximizing use of the ROW for cars and moving the bridge to a location outside of the Greenbelt crossing.

Mike Johnson noted that the facility is likely to receive truck traffic regardless of the alignment chosen, so it should be made as truck-friendly as possible. Tracy asked whether the trucks would be carrying hazardous material, and Mike responded that was a possibility that warranted future discussion.

MEETING SUMMARY

Aubrey Stakeholders Meeting
Aubrey City Hall, 107 S. Main Street, Aubrey, Texas
10:30 am, Tuesday, January 8, 2019

Stakeholders associated with the city of Aubrey met on Tuesday, January 8, 2019 at 10:30 am at Aubrey City Hall in Aubrey, Texas. The following individuals were present:

Frank Abbott, Kimley-Horn
Nathan Drozd, North Central Texas Council of Governments (NCTCOG)
Mark Kaiser, City of Aubrey
Jeff Neal, NCTCOG
Richard Rogers, Venable Ranch
Patricia Rohmer, P.E., NCTCOG
Wes Tydlaska, Venable Ranch
Kate Zielke, NCTCOG

The stakeholders sought the meeting to discuss the recommendations in the Draft Denton Greenbelt Corridor Feasibility Study and suggest revisions to those recommendations. Richard Rogers said the study has to abide by federal rules because the roadway project will be constructed with federal funds. He said he had presented the suggested revisions to the Greenbelt Alliance.

Frank Abbot said he used survey data from landowners to produce concept maps of a roadway expansion in the Denton Greenbelt that would include more lanes in the Denton Greenbelt crossing than proposed by the feasibility study. He noted the need to accommodate equestrians who access trails via the trailhead at FM 428. The concept maps he presented would preserve the historic bridge but would require acquisition of some land from the conservation easement held by the US Army Corps of Engineers (USACE) and additional land from federal lands owned by USACE. He said the estimated acreage impacts were small. The concept maps included a cloverleaf providing access to the parking lot at the FM 428 trailhead, which is east of the Elm Fork of the Trinity River. Frank said the cloverleaf would allow distance for horse trailers to safely accelerate and decelerate. He said local landowners would have access to the cloverleaf interchange.

Frank said the landowners he represents do not believe the four-lane recommendation in the draft feasibility study will accommodate future traffic. He said the demographic projections in the feasibility study do not reflect planned development in Aubrey. He said the recommendation should accommodate plans for multimodal travel.

Jeff Neal said the recommendation for four lanes is based on the existing right-of-way of 150 feet, which includes the historic bridge. Nathan Drozd said the language of the conservation easements that flank the right-of-way is strict and modifying the easements may require action from Congress. Jeff said removal of the historic bridge would provide room for six lanes, but he noted the existing use of the historic bridge for bicycle and pedestrian travel. He said the feasibility study could discuss a wider right-of-way as a forecast of environmental study needs.

Wes Tydlaska said restricting the roadway to four lanes in the Denton Greenbelt could produce pollution and noise impacts. Nathan said these would be park impacts, and abatements would be required. He said the conservation easement included protective covenants on the fee simple, USACE-owned land. Richard said a double-decked roadway would stay within the existing right-of-way, but the Greenbelt Alliance board prefers acquiring a wider roadway to a double-decked roadway, which he says would have noise and visual impacts.

Patricia Rohmer said it would be possible to move the historic bridge, but it would be a long process. Richard suggested meeting with an existing contact at USACE to discuss the conservation easement. Frank said an eight-lane facility with shoulders would fit in 144 feet. Patricia said the recommended four lanes are in the southern part of the right-of-way and include some room for maintenance. She and Nathan concurred that about 95 to 100 feet of right-of-way is available if the historic bridge remains in place.

Mark Kaiser said the expected growth in Aubrey calls for six or more lanes. He said staying within the existing right-of-way and moving the bridge may be politically, if not financially, most practical. Nathan said NCTCOG could make recommendations in the feasibility study but ultimately Texas Department of Transportation would decide how to move forward. Mark said unified local participation and political pressure could help promote the higher number of lanes. Mark said he would seek the support of other jurisdictions.

Mark asked what steps needed to occur for the project to be included in NCTCOG's Transportation Improvement Program. Nathan said stakeholders should talk to the director of NCTCOG's Transportation Department and discuss with Texas Department of Transportation the need for the entire project to move forward. Mark said this meeting seeks to get the additional lanes included in the feasibility study so stakeholders can cite the study when seeking support.

Mark said Aubrey's most recent master plan calls for the city to reach a population of 50,000 but with capacity for 150,000. Jeff said the feasibility study could reference these projections, which are larger than NCTCOG projections for the city's population.

Frank asked whether a third alignment could be included in the final feasibility study. He said landowners would support the western half of Alignment 2 (which includes Milam Road) and the eastern half of Alignment 1 (the more southerly route through Aubrey). He said the eastern half of Alignment 1 is consistent with the Denton County Thoroughfare Plan and Aubrey's Master Thoroughfare Plan. He said Alignment 1 affects as little residential property in Aubrey as possible.

Jeff noted that NCTCOG's 10-Year Plan of Projects includes money for the Denton Greenbelt crossing at FM 428 because this crossing must be secured so the Collin County Outer Loop project and the remainder of the corridor in Denton County can move forward.

Kate Zielke said landowners can submit their support for alignments; this feedback will be included in the final feasibility study, which will be available at the end of March. Mark said he would like to meet with the Director of NCTCOG's Transportation Department after the final feasibility study is released.

Investing in Sustainability

Denton Greenbelt Stakeholder Meeting #3

January 22 and 23, 2019

North Central Texas
Council of Governments

Agenda

1. Introductions
2. Project background
3. Transportation planning and feasibility study processes
4. Draft recommendations
5. How comments will be included
6. Summary of comments to date
7. Stakeholder comments

Introductions

Hello!

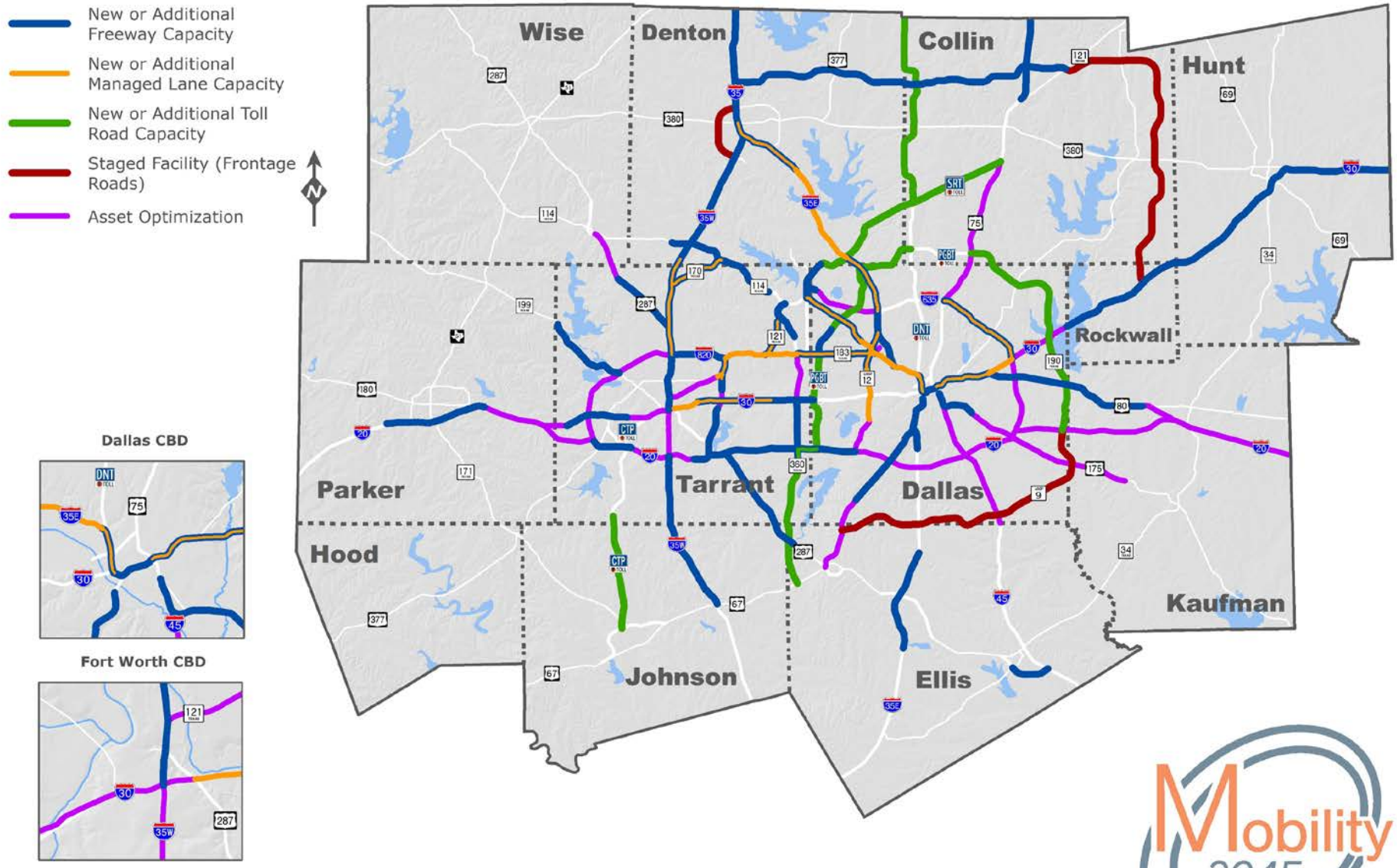
Project Background

The North Central Texas Council of Governments (NCTCOG) is the metropolitan planning organization that conducts long-range transportation planning for the 12-county Dallas-Fort Worth region.

Projects for the region are included in Mobility 2045, the region's current long-range plan.

Plans for these projects are refined with further study and feedback from stakeholders.

Major Roadway Recommendations



North Central Texas Council of Governments

Facility recommendations indicate transportation need. Corridor-specific alignment, design, and operational characteristics will be determined through ongoing project development.

Mobility 2045

June 2018

Future Growth

North Central Texas Regional Demographics

Year	Population	% Change	Employment	% Change
1990 Census	4,013,418		2,534,340	
2000 Census	5,197,317	29%	3,191,576	26%
2010 Census	6,417,724	23%	4,045,726	27%
2018	7,429,723	16%	4,793,363	18%
2028	8,722,529	17%	5,455,956	14%
2037	10,188,220	17%	6,382,301	17%
2045	11,246,531	10%	7,024,227	10%

Population Growth

City	Population		Estimated 2018 Population	% Change per year	Projected 2040 Population	% Change per year
	2000	2010				
Celina	1,861	6,028	13,090	14.6	89,000	26.4
Aubrey	1,500	2,595	4,040	7.0	7,349	3.7
Denton	80,537	113,383	130,990	2.0	268,780	4.8

Sustainability and Environmental Stewardship

Plans for new feasibility study:

- Assess needs
- Identify solutions
- Preliminary-level review of the affected environment
- Incorporate sustainability and environmental stewardship best practices recommended by the Federal Highway Administration sustainability tool, INVEST

Transportation Planning Process

Step 1: Identify Regional Needs

Step 1: Based on current and forecast demographics

Step 2: Include in the Metropolitan Transportation Plan

Step 2: Develop MTP and recommend mode based on regional needs

Step 3: Conduct Planning, Preliminary Design, and Environmental Studies

Step 3: Develop and evaluate corridors and alignment alternatives

- Complete environmental and preliminary engineering; Obtain environmental approval(s)

Step 4: Develop Detailed Construction Plans

Step 4: Develop construction and operation plans

- Determine implementing agency and funding sources
- Determine project staging plan

Step 5: Acquire Right-of-Way

Step 5: Acquire and/or preserve right-of-way to expedite future construction efforts

Step 6: Construct

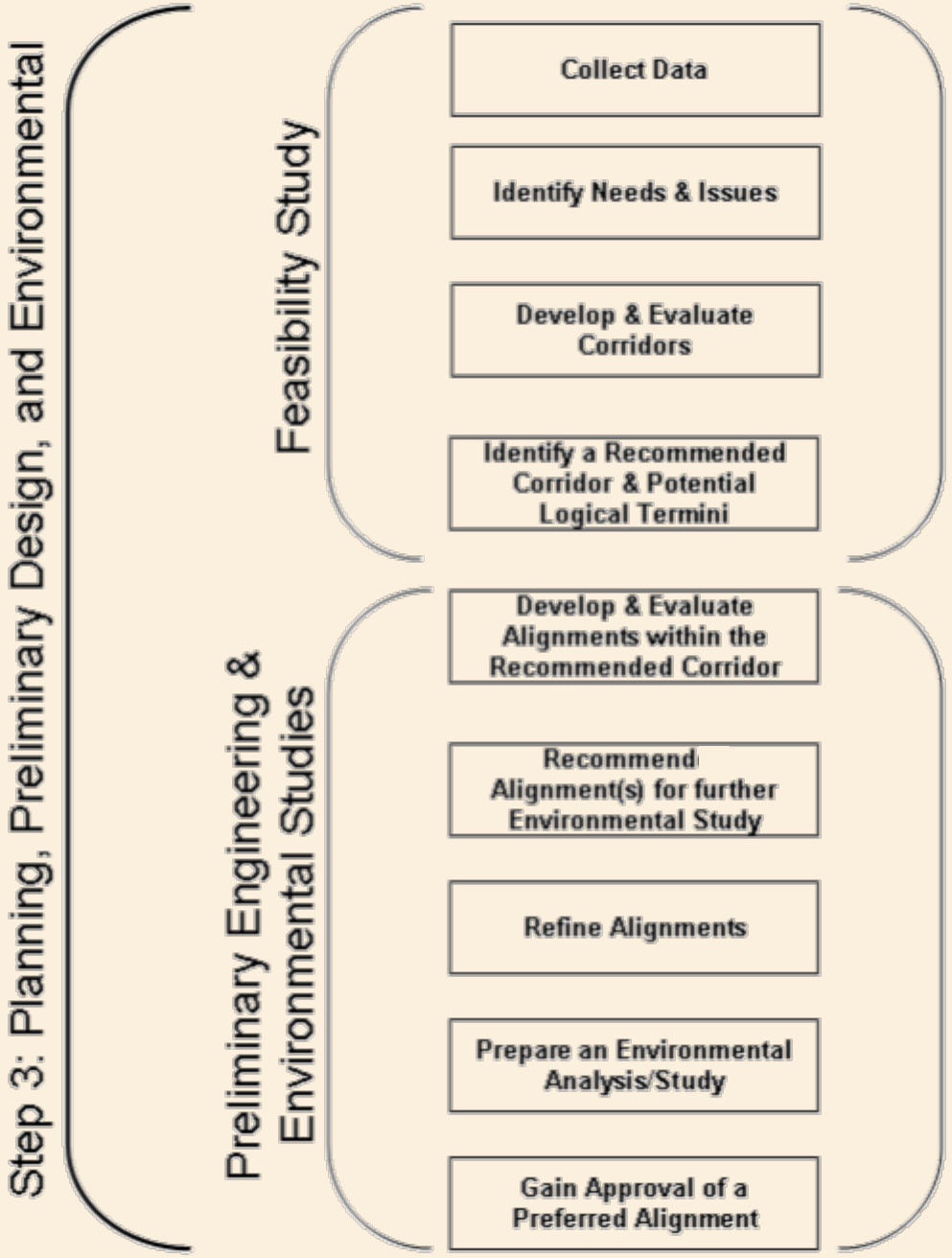
Step 6: Construct

- Staged construction – may take 10 to 20 years
- Section priority based on travel demand

Step 7: Open to Traffic

Step 7: Open for operation

Transportation Planning Process

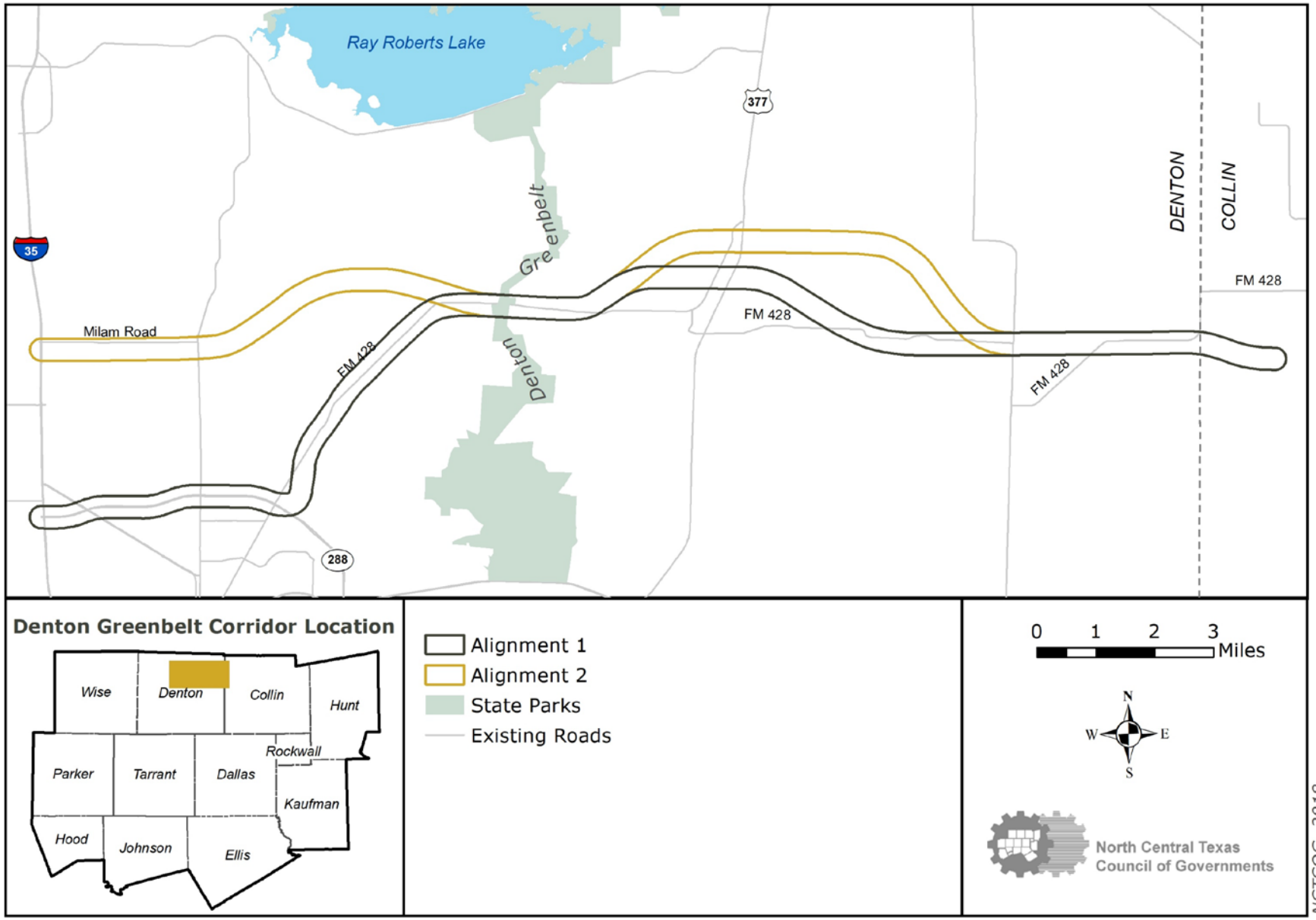


Feasibility Study Process

Task	2017			2018				2019
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Data Collection								
Need and Purpose								
Public and Agency Outreach • Stakeholder Meetings • Resource Agency Meetings • Presentations or Additional Outreach	◇	○ △	◇ △	◇	△		◇	◇
Corridor Development								
Recommendations								
Finalize Report								

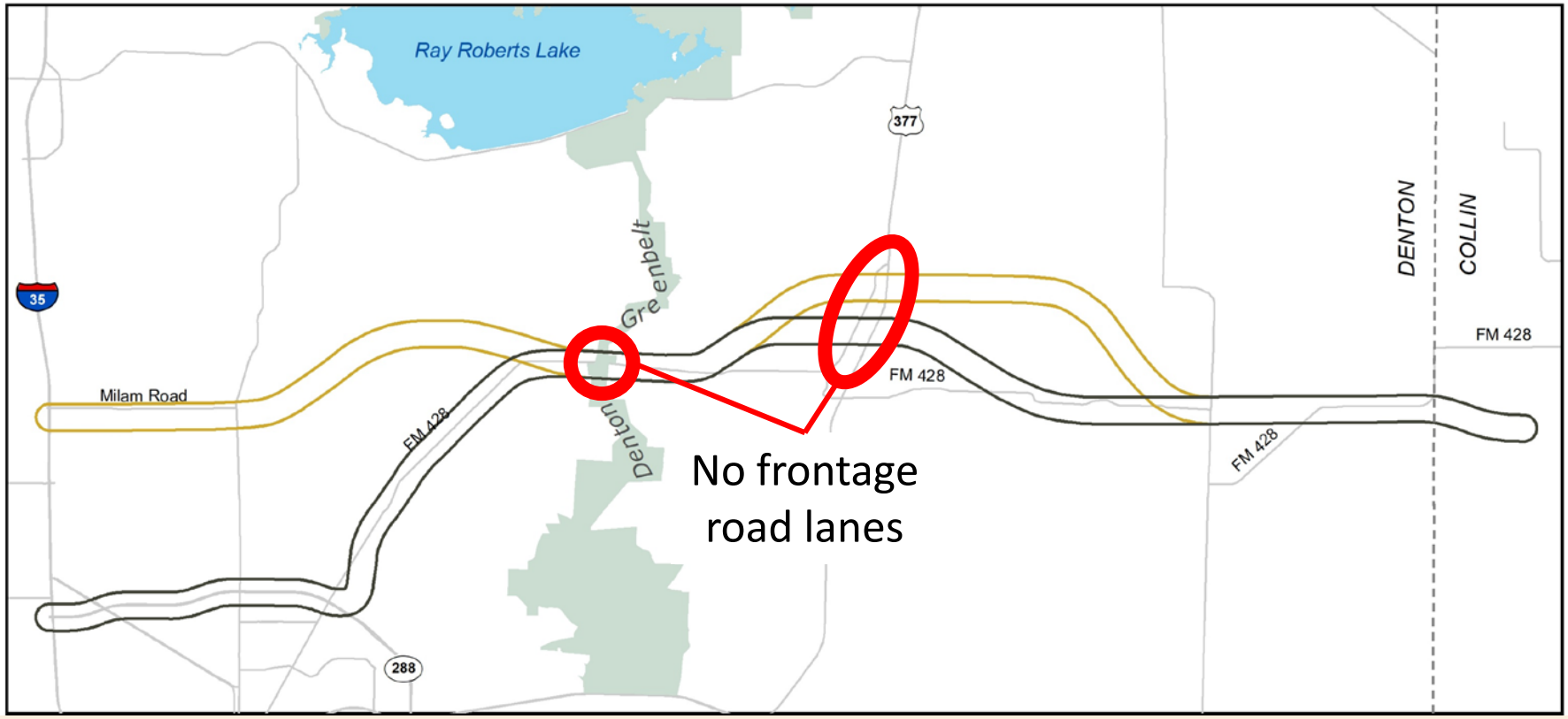
Figure A-1: Proposed Alignments

Denton Greenbelt Corridor Feasibility Study



Draft Recommendations

- Four general purpose lanes plus occasional auxiliary lanes between IH 35 and US 377
- Six general purpose lanes plus occasional auxiliary lanes between US 377 and DNT (just east of the Denton/Collin County line)
- Four frontage road lanes (two lanes in each direction) plus occasional auxiliary lanes throughout its entire length except for:
  - The Greenbelt (Elm Fork Trinity River) crossing
  - The US 377/Texas & Pacific Railroad crossing



Four general purpose lanes plus occasional auxiliary (such as turn) lanes

Six general purpose lanes plus occasional auxiliary lanes between US 377 and DNT

Four frontage road lanes (two lanes in each direction) plus occasional auxiliary lanes

Why Study Makes These Recommendations

- Projected average daily volume of 69,300 vehicles
- Seeking level-of-service D to balance financial planning requirements
- Special design considerations for conservation easements, historic bridge, and railroad crossing

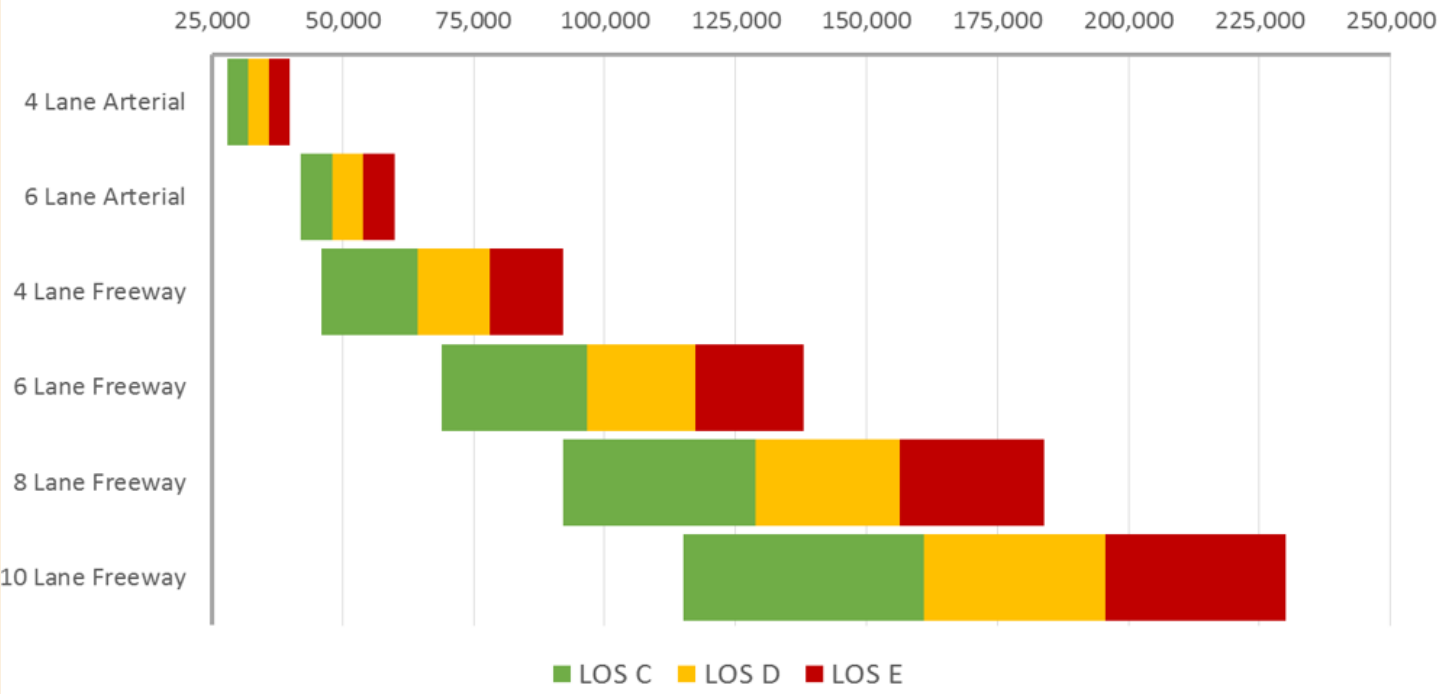
Recommended Next Steps

- Further evaluation of typical section and alignments, with consideration of local plans for transit, bicycle, and pedestrian facilities
- Possible site-specific ecological assessment during environmental study
- Engineering plans more finalized than typical 10 to15 percent are requested by Texas Parks & Wildlife Department before sign-off for Section 4(f) (consideration of park and recreation lands, wildlife and waterfowl refuges, historic sites)
- Continued engagement of federal and state agencies and stakeholders

Recommended Next Steps

- Consideration of context sensitive solutions approach
- Consideration of safety for horse trailers – classify as freight
- Consideration of stakeholders' submitted priorities for mitigation
- Inclusion of stormwater treatment to remove oil and associated chemicals
- Continued involvement of NCTCOG study team

LANES WARRANTED BY DAILY VOLUME



Produced for illustrative purposes, volume/capacity information sourced from *Highway Capacity Manual 2010* as applied by NCTCOG staff.

Collin County Strategic Roadway Plan

Level of Service	General Operating Conditions
A	Free flow, with low volumes and high speeds.
B	Reasonably free flow, but speeds beginning to be restricted by traffic conditions.
C	Stable flow, but most drivers are restricted in the freedom to select their own speeds.
D	Approaching unstable flow; drivers have little freedom to select their own speeds.
E	Unstable flow; may be short stoppages.
F	Forced or breakdown flow; unacceptable congestion; stop-and-go.

US Department of Transportation

How Comments Will be Included in Study

- Included in Stakeholder Involvement chapter
- Included as appropriate in Next Steps chapter
- Information from the study will be carried forward into the National Environmental Policy Act process conducted by Texas Department of Transportation

  Pending approval and available funds, this process would authorize the project's construction

How to Provide Comments

- During today's meeting
- Via email, mail, or phone through February 22, 2019 (to be included in final study)

  kzielke@nctcog.org

  Kate Zielke, Centerpoint II, 616 Six Flags Drive, Arlington, TX, 76011

  817-608-2395
- Comments at a later date always welcome, but won't be received in time to be included in final study

Summary of Comments to Date

Thlopthlocco Tribal Town: Would like to remain a consulting party. Study should discuss identification of properties of cultural and traditional significance to Tribes. Probability models should not be used to eliminate or minimize areas from identification efforts.

Kiowa Tribe of Oklahoma: Proposal project location should have minimal potential to adversely affect any known Archaeological, Historical, or Sacred Kiowa sites. Undiscovered properties encountered must be immediately reported to Kiowa Tribe Office of Historic Preservation.

Summary of Comments to Date

Venable Ranch and associates:

- A conceptual map was provided depicting cloverleaf access to FM 428 parking lot that would provide acceleration and deceleration accessibility for horse trailers.
- Conceptual maps were provided of 8-lane facilities that would require the conversion of approximately 0.37 acres or 5.73 acres of conservation easement and approximately 1.77 acres or 7.59 acres of other federal lands. These 8-lane facilities may require relocating the historic bridge.
- Support given to western portion of Alignment 1 (Milam Road) and eastern portion of Alignment 2 (more southernly route through city of Aubrey)

Revised

Summary of Comments to Date

Venable Ranch and associates:

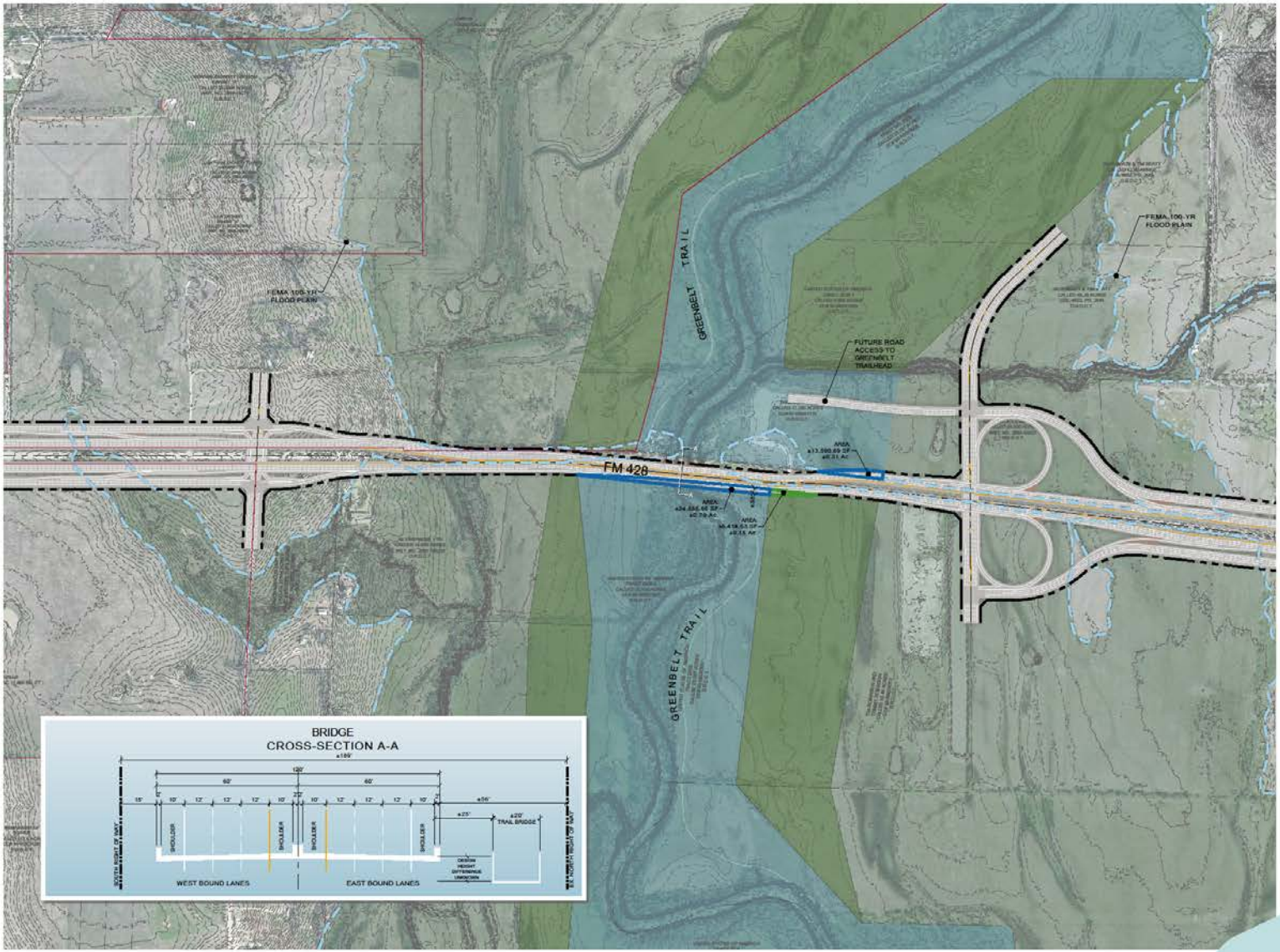
- A conceptual map was provided depicting cloverleaf access to FM 428 parking lot that would provide acceleration and deceleration accessibility for horse trailers.
- Conceptual maps were provided of one 6-lane facility and two 8-lane facilities that would require the conversion of some conservation easement and federal lands: ~~0.37 acres or 5.73 acres of conservation easement and approximately 1.77 acres or 7.59 acres of other federal lands. These 8-lane facilities may require relocating the historic bridge.~~

Estimated Acreage	6-Lane Facility	8-Lane Facility	8-Lane Facility with Full Median
Federal Lands	1.1	1.77	7.59
Conservation Easement	0.15	0.37	5.73

- Support given to western portion of Alignment 1 (Milam Road) and eastern portion of Alignment 2 (more southernly route through city of Aubrey)

Summary of Comments to Date

City of Aubrey: City of Aubrey projects their future population size at 50,000, which is greater than NCTCOG's projected population size for the city. Restricting the roadway to a four-lane facility could lead to congestion in the Denton Greenbelt.



GRAPHIC SCALE IN FEET
1"=300' @ 22x34

LEGEND

CONSERVATION EASEMENT

USA PROPERTIES

NOTE:
THIS EXHIBIT SHALL NOT BE CONSIDERED A SCHEMATIC. AREAS AND DISTANCES ARE SUBJECT TO CHANGE BASED ON FINAL SCHEMATIC DESIGN.

OPTION:
6 LANES UNDIVIDED AT BRIDGE

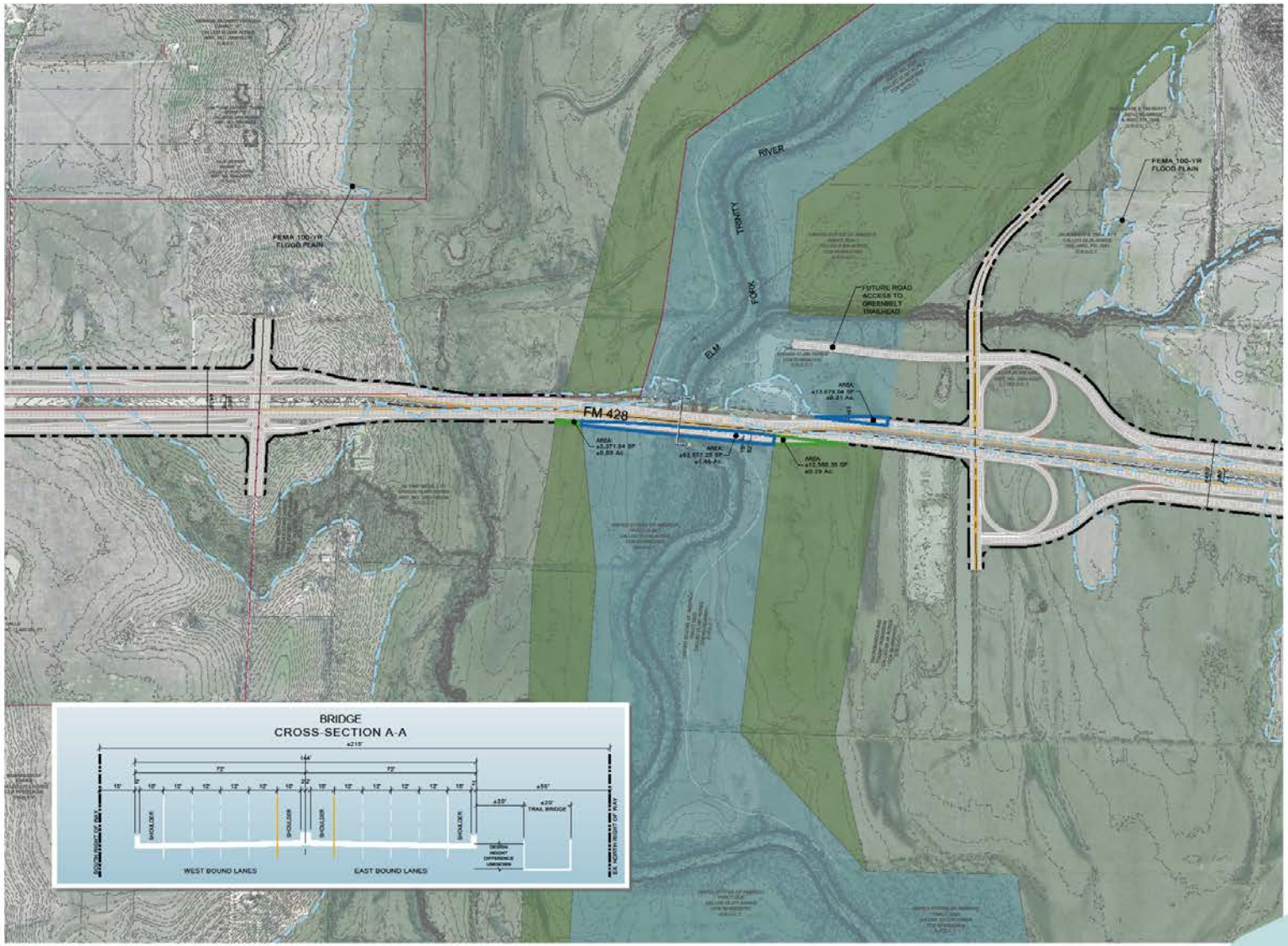
DENTON COUNTY

Greenway Parkway Corridor

FM 428 AT TRINITY CROSSING

Denton County, Texas
January 2019

Kimley»Horn
5750 Genesis Court
Suite 200
Frisco, Texas 75034
972-335-3580
State of Texas Registration No. F-928



GRAPHIC SCALE IN FEET
1"=300' @ 22x34

LEGEND

CONSERVATION EASEMENT

USA PROPERTIES

NOTE:
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OPTION:
8 LANES UNDIVIDED AT BRIDGE

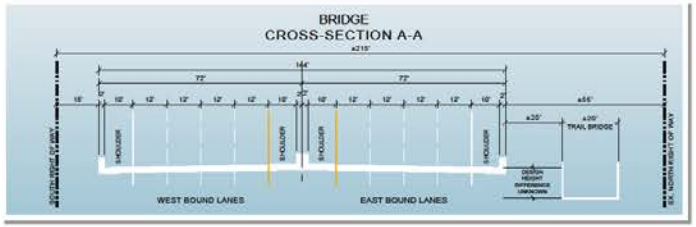
DENTON COUNTY

Greenway Parkway Corridor

FM 428 AT TRINITY CROSSING

Denton County, Texas
January 2019

Kimley»Horn
5750 Genesis Court
Suite 200
Frisco, Texas 75034
972-335-3580
State of Texas Registration No. F-928



LEGEND

- CONSERVATION EASEMENT
- USA PROPERTIES

NOTE:
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OPTION:
VIEW 2 OF 8 LANES UNDIVIDED AT BRIDGE

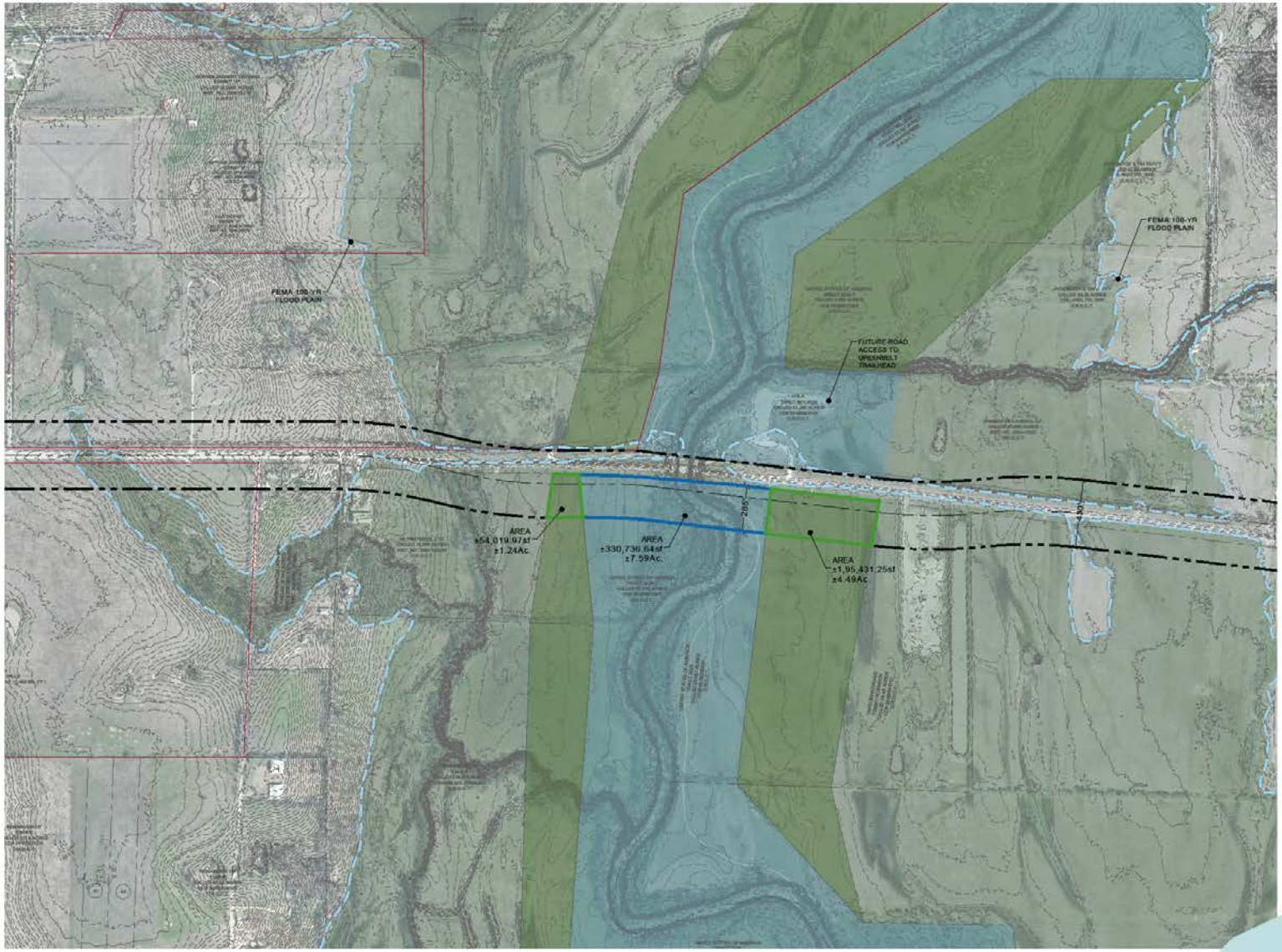
DENTON COUNTY

Greenway Parkway Corridor

FM 428 AT TRINITY CROSSING

Denton County, Texas
January 2019

Kimley»Horn
5750 Genesis Court
Suite 200
Frisco, Texas 75034
972-335-3580
State of Texas Registration No. F-928



GRAPHIC SCALE IN FEET
1"=300' @ 22x34

LEGEND

CONSERVATION EASEMENT

USA PROPERTIES

NOTE:
THIS EXHIBIT SHALL NOT BE CONSIDERED A SCHEMATIC. AREAS AND DISTANCES ARE SUBJECT TO CHANGE BASED ON FINAL SCHEMATIC DESIGN.

OPTION:
8 LANES UNDIVIDED WITH FULL MEDIAN

DENTON COUNTY

Greenway Parkway Corridor

FM 428 AT TRINITY CROSSING

Denton County, Texas
January 2019

Kimley»Horn
5750 Genesis Court
Suite 200
Frisco, Texas 75034
972-335-3580
State of Texas Registration No. F-928

Stakeholder Comments

Getty Images

Contact Information

Patricia Rohmer, P.E. – Project Engineer
prohmer@nctcog.org
817-608-2307

Kate Zielke – Feasibility Study and Sustainability Efforts
kzielke@nctcog.org
817-608-2395

Nathan Drozd – Feasibility Study
ndrozd@nctcog.org
817-704-5635

Jeff Neal – Streamlined Project Delivery Program Manager
jneal@nctcog.org
817-608-2345

Amanda Long-Rodriguez – Environmental Data, Case Studies of Roadways through Parks
along@nctcog.org
817-608-2367

MEETING SUMMARY

Denton Greenbelt Stakeholders Meeting
Rancho de la Roca, 2459 Blackjack Road West, Aubrey, Texas
1 pm, Tuesday, January 22, 2019

ATTENDEES:

Frank Abbott, Kimley Horn and Associates
Blake Alldredge, Upper Trinity Water District
Katherine Barnett, City of Denton
Tim Beaty, Greenbelt Alliance
Ken Dickson, Greenbelt Alliance
Rob Jordan, United States Army Corps of Engineers (USACE)
Mark Kaiser, City of Aubrey
Tracy Matern, Lake Ray Roberts Equestrian Trails Association, Trinity Trail Preservation Association, Texas Equestrian Trail Riders Association
Janet Meyers, City of Aubrey
Jeff M. Miller, City of Aubrey
Linda Moore, Lake Ray Roberts Equestrian Trails Association
Nicholas Wilson, USACE
Curtis Peterson, USAGE
Richard Rogers, Greenbelt Alliance
Ben A. Stephenson, Water Utilities, City of Dallas
Chris True, Texas Parks and Wildlife Department (TPWD)
Wes Tydlaska, Venable Ranch

North Central Texas Council of Governments (NCTCOG) Staff:
Amanda Long-Rodriguez
Patricia Rohmer
Jeff Neal
Kate Zielke

PRESENTATION

Kate Zielke provided a short presentation summarizing NCTCOG's role and efforts to date for the Denton Greenbelt Corridor Feasibility Study. She reviewed the recommendations made in the Next Steps chapter of the study, many of which came from stakeholder suggestions. Kate then explained that comments given during the meeting would be included in the final feasibility study. She reviewed the comments procedure and mentioned that although February 22, 2019 was the final day to submit an official comment for inclusion in the feasibility study, continued involvement in the process is encouraged and welcomed. Kate concluded her presentation with a summary of the comments that had already been provided, including comments from Thlopthlocco Tribal Town, Kiowa Tribe of Oklahoma, Venable Ranch and Associates, and the city of Aubrey.

STAKEHOLDER COMMENTS

Small Changes
It was requested that the word "equestrian" be added to the bicycle pedestrian section of the Next Steps chapter. NCTCOG staff explained that equestrian travel is typically considered recreation, not

transportation. However, NCTCOG staff noted that another project has included equestrian considerations and the word would be added.

Frontage Road
There was a discussion concerning the absence of frontage roads at the Texas & Pacific Railroad crossing at US 377. NCTCOG staff said Class 1 railroads have recommended avoiding new at-grade crossings where possible. The feasibility of a grade-separated crossing would be determined during the environmental phase. The stakeholder suggested the feasibility study call for considering the economic and congestion benefits of including frontage roads at the crossing.

Number of Lanes
It was suggested by a stakeholder that the study recommend consideration of six lanes where FM 428 crosses the Denton Greenbelt. The stakeholder suggested that a footprint wider than four lanes may be required considering expected growth and existing congestion along SH 121 and US 380. The stakeholder said engineering methods could address environmental concerns while simultaneously relieving congestion and air quality issues. A stakeholder called for the roadway to be eight lanes to prevent congestion such as that on US 380. NCTCOG staff explained fiscal constraints can limit the number of lanes in a roadway project. A stakeholder suggested that a footprint large enough to accommodate the potential for more lanes for phased construction should be considered.

Planning Process
A stakeholder asked whether future planning by the Texas Department of Transportation (TxDOT) would be limited to the two alignments that were recommended in the study. NCTCOG staff said the National Environmental Policy Act (NEPA) process would look at the No-Build scenario and a variety of alignments; the findings of the NEPA process would be the final recommendation.

Trail and Park Condition
A stakeholder mentioned that trail access under the roadway was not discussed in the study and asked that it be included. Another stakeholder added that separate and wider trails should be considered for bikes and pedestrians/equestrians, as they travel at different speeds and require different surface types. Consideration of a two-lane trail connecting to Aubrey was also requested.

A stakeholder also mentioned a need for several modifications to the state park at the FM 428 entrance. These included a larger parking lot with pull in and pull out parking stalls to accommodate large trucks and horse trailers. Because the expanded roadway will increase visibility of the park, stakeholders also requested safety considerations for the park, including lighting, a manned booth, and/or some other security system.

Other park improvements suggested by stakeholders, including those to accommodate future increased visitation, were:

- Addressing sections of the trail that are most likely to erode due to rain and flood events
- Rerouting trails or creating an elevated walkway in areas where horses may get stuck due to boggy conditions
- Providing a ramp instead of steps for canoe access
- Upgrading bathroom facilities, lighting, landscaping, and picnic areas
- Planting trees within the park to function as sound mitigation; plantings should occur well in advance of construction to allow the trees to grow
- Preventing utility powerlines that would diminish the visual appeal of the park

Support was given to recommendations made in the study, including naming the roadway Greenbelt Parkway or a similar name and using landscaping and aesthetic elements to integrate the road with the community.

NCTCOG staff confirmed the parking lot is on TPWD property, making some improvements potentially difficult to implement using federal transportation funds. However, as similar improvements have been made in the past on other roadway projects, some source of funding may be available for these suggestions.

City of Aubrey
A representative from the city of Aubrey discussed expected growth in Aubrey and the implications the Denton Greenbelt Corridor may have on the city. Concern was expressed about the absence of a connection between US 377 and the corridor. The representative said a connection is crucial for commercial access both for the city of Aubrey and the Aubrey Independent School District. The representative said subdivisions were planned that would bring 13,500 residences to the area; the city may grow from 4 square miles to 40 square miles and increase in population from 2,300 to 50,000. Concern was expressed about the lack of connectivity in the area, and the city's need for east-west connectivity. The representative said limited possibilities for transportation infrastructure to cross the Denton Greenbelt mean this roadway should be completed correctly the first time.

NCTCOG staff commented that a direct connection to US 377 was modelled for the corridor, but without continuous frontage roads.

Safety/Conservation Easement
A stakeholder who grew up along FM 428 raised safety concerns about the corridor transitioning from six to four lanes at the Denton Greenbelt. The stakeholder said the presence of agricultural combines on FM 428 could cause potentially fatal safety issues. Another stakeholder mentioned safety concerns for cyclists at this location.

A stakeholder asked whether the feasibility study would discuss expanding the right-of-way into the conservation easements held by USACE. NCTCOG staff said the study could recommend for future study the possibilities of relocating the historic bridge or expanding the right-of-way in the Denton Greenbelt to accommodate six or eight lanes.

The use of 2045 as the horizon planning year was questioned. NCTCOG staff said TxDOT may project out beyond 2045.

Park Access
Citing the Kimley Horn and Associates concept map proposing cloverleaf access to the park, a stakeholder asked whether the design could be modified to take up less space, as long as the acceleration and deceleration ramps accommodate modern horse trailers.

Traffic Lights
A stakeholder asked if the corridor would include traffic lights. NCTCOG staff said the corridor is being designed as a controlled access facility with few or no traffic lights.

Stormwater Treatment
A stakeholder supported the treatment of stormwater from the proposed facility and expressed that the maintenance responsibility of this system should be identified in advance.

Ecological Concerns
A stakeholder expressed concern for the ecological aspects of the park as a result of the new corridor.

The stakeholder said safe passage of wildlife across six or eight lanes would be difficult and that innovative methods should be considered. The importance of wildlife to park recreators was also emphasized. The use of a wildlife crossing such as a natural land bridge both for recreators and wildlife was suggested.

History of Greenbelt

A stakeholder supported pursuing efforts to acquire right-of-way in the conservation easement if this allowed for a roadway with increased safety and efficient access to the park; the stakeholder noted this may require appropriate mitigation and permission from the Secretary of the Army or federal legislation. The stakeholder said federal legislation was used to purchase the land of the Denton Greenbelt. Several public forums held prior to the Greenbelt's creation promised, to wide support, public recreation along the entire length of the Greenbelt for a variety of users. While funds were given to purchase the land, nothing was provided by Congress or cities to maintain to park. Citizens have protected and maintained the park with the help of TPWD through donations, festivals, events, runs, sponsorship, grants, and personal time. The stakeholder said the FM 428 entrance to the park will be the front door to the Greenbelt because flooding has closed access to the southern half of the Greenbelt for four years. The stakeholder emphasized the importance of the natural and scenic park and its historic bridge to the community today and for future generations.

Alignment Support

Several statements of alignment support were made:

1. On behalf of the Estate of Bert Fields Jr., who owns approximately 2,500 acres at FM 1385 and FM 428, a statement in support of Alignment 1 was made.
2. On behalf of Venable Ranch, a statement in support of Alignment 1 was made.
3. City of Aubrey is in support of eight lanes to prevent congestion and the southern alignment.

MEETING SUMMARY

Denton Greenbelt Stakeholders Meeting
Webinar
2 pm, Wednesday, January 23, 2019

ATTENDEES:

Ann Boulden, Denton County Transportation Authority (DCTA)
Connie Hill Galloway, Federal Highway Administration (FHWA)
Carol Nichols, Greenbelt Alliance, Lake Ray Roberts Equestrian Trails Association
Richard Rogers, Greenbelt Alliance, Venable Realty, Property Owner

North Central Texas Council of Governments (NCTCOG) Staff:
Amanda Long-Rodriguez
Patricia Rohmer
Kate Zielke

PRESENTATION

Kate Zielke provided a short presentation summarizing NCTCOG's role and efforts to date for the Denton Greenbelt Corridor Feasibility Study. She reviewed the recommendations made in the Next Steps chapter of the study, many of which came from stakeholder suggestions. Kate then explained that comments given during the meeting would be included in the final feasibility study. She reviewed the comments procedure and mentioned that although February 22, 2019 was the final day to submit an official comment for inclusion in the feasibility study, continued involvement in the process is encouraged and welcomed. Kate concluded her presentation with a summary of the comments that had already been provided, including comments from Thlopthlocco Tribal Town, Kiowa Tribe of Oklahoma, Venable Ranch and Associates, and the city of Aubrey.

STAKEHOLDER COMMENTS

Park and Trail Access
A stakeholder said roadway access to the park must allow for the acceleration and deceleration of trailers and big trucks, especially in light of the expected increase in traffic. Future generations' ability to enjoy the park is important, the stakeholder said, and this will require investment in maintenance. Flooding has closed the trailhead at US 380 for much of the past five to seven years, and only half the trails have been open continuously since the park's inception, the stakeholder said.

Number of Lanes
A stakeholder asked for clarification on the level of service and number of lanes recommended in the draft feasibility study, which the stakeholder said included conflicting statements between what was warranted and what was recommended. NCTCOG staff said Mobility 2045, the region's long-range transportation plan, recommended six lanes, but the conservation easement held by the US Army Corps of Engineers restricts the roadway to four lanes where it crosses the Denton Greenbelt. NCTCOG staff clarified that the level of service was a result of financial restrictions.

The stakeholder said community support may lead to US Army Corps of Engineers acceptance of a six-lane roadway across the Denton Greenbelt. The stakeholder said the roadway's location providing east-west connectivity would generate traffic that could not be accommodated by four lanes, and congestion

at the gateway to the park was not desirable. Another stakeholder said planning must prevent the park from being destroyed by the road.

Wildlife Over/Underpass
A stakeholder expressed support for a wildlife overpass similar to those along US 93 in Montana. The stakeholder said a wildlife overpass could provide acreage back to the park, while also eliminating noise, mud, and other issues that could result from traveling underneath the roadway. The stakeholder cited overpasses such as Dallas' Klyde Warren Park and Katy Trail. The stakeholder said wildlife passages are needed east and west of the river.

Another stakeholder supported safe passage for both wildlife and recreational users. However, the stakeholder expressed support for a method identified by experts as the most useful and cost effective.

East-West Transit
A stakeholder said an east-west transit connection will be needed in the future along either FM 428 or US 380. The stakeholder asked for this need to be considered as planning for the Denton Greenbelt Corridor progresses.

FHWA
Connie Hill Galloway, FHWA's grant coordinator for the Denton Greenbelt Corridor project, noted the engagement of the project stakeholders.

[redacted]

January 10, 2019

Kate Zielke
Senior Transportation Planner
North Central Texas Council of Governments (NCTCOG)
P.O. Box 5888
Arlington, TX 76005-5888

RE: Section 106 Consultation and Review Seeking Comments on the NCTCOG Draft Study of Proposed Roadway Expansion Project, the expansion would travel through a conservation area and state park that border the Elm Fork of the Trinity River, Denton County, TX

Dear Ms. Zielke,

The Kiowa Tribe Office of Historic Preservation has received the information and materials requested for our Section 106 Review and Consultation. Section 106 of the National Historic Preservation Act of 1966 (NHPA), and 36 CFR Part 800 requires consultation with the Kiowa Tribe.

Given the information provided, you are hereby notified that the proposal project location should have minimal potential to adversely affect any known Archaeological, Historical, or Sacred Kiowa sites. Therefore, in accordance with 36 CFR 800.4(d) (1), you may proceed with your proposed project. However, please be advised undiscovered properties may be encountered and must be immediately reported to the Kiowa Tribe Office of Historic Preservation under both the NHPA and NAGPRA regulations.

This information is provided to assist you in complying with 36 CFR Part 800 for Section 106 Consultation procedures. Please retain this correspondence to show compliance. Should you have any questions, please do not hesitate to contact me at [redacted]. Thank you for your time and consideration.

Sincerely,

[redacted]
Acting Tribal Historic Preservation Officer (THPO)

From: [redacted]
To: Kate Zielke
Subject: RE: Study addressing sustainability of roadway expansion in Denton County, Texas
Date: Wednesday, February 27, 2019 9:46:37 AM

Ms. Zielke,

Hello, my name is [redacted] and I work for the Muscogee (Creek) Nation's historic and cultural preservation department and cover the state of Texas for Section 106 review. Please excuse my tardiness in responding to your email as I see that it was due on Feb 22nd. Denton County is currently outside of the Muscogee (Creek) Nation's area of interest (AOI). North Texas was the location that many of our citizens sought refuge during the US Civil War. Due to the vagueness of historical records and the marginalization of Indian people during that time, we maintain a 13 county area of interest in North Texas. Again, due to the vagueness of records, Denton County is not, but can be incorporated into our AOI if new records or cultural resources are discovered.

As for the project, I reviewed the proposed routes in the Texas site files and there are some parts of the route that have been subjected to a Phase I intensive cultural resources survey but the majority of the route is not. The Muscogee (Creek) Nation would want to see evidence of the survey by reviewing the report to ensure that cultural resources are not needlessly being impacted. I am pleased to see that the proposed route uses the existing crossing of the Denton Greenbelt – because there are known archaeological resources in that area. The Muscogee (Creek) Nation is currently unaware of any Muscogee cultural sites within the APE of the proposed project.

I appreciate you and the NCTCOG for reaching out to the Muscogee (Creek) Nation and incorporating us into consultation. Please let me know if you have any questions or need clarification on anything.

Also, [redacted] is our department manager so if you could update your contact list to send correspondence to [redacted] and CC me it should ensure that we get a response to you in a timely fashion. I appreciate your time, mvto!

[redacted]
Historic and Cultural Preservation Department, Archaeological Technician
Muscogee (Creek) Nation
[redacted]

From: Kate Zielke [mailto:KZielke@nctcog.org]
Sent: Wednesday, December 19, 2018 2:48 PM
To: [redacted]
Subject: FW: Study addressing sustainability of roadway expansion in Denton County, Texas

THLOPTHLOCCO TRIBAL TOWN

Tribal Historic Preservation Office

[redacted] *Tribal Historic Preservation Officer*

[redacted]

January 2, 2019 THPO File Number: 2019-001

Kate Zielke
Senior Transplantation Planner
Environmental Coordination/Environmental Justice
North Central Texas Council of Governments

RE: Draft Denton Greenbelt Study

Dear Ms. Zielke,

Thank you for contacting the Thlopthlocco Tribal Town Tribal Historic Preservation Office (THPO) regarding the Draft Denton Greenbelt Study Document. My office has reviewed the document and offers the following comments.

Thlopthlocco Tribal Town would like to remain a consulting party for the duration of this undertaking.

There is no discussion within the document pertaining to identification of historic properties consistent with 36CFR800.4 (b) of the implementing regulations of the National Historic Preservation Act (NHPA) which includes properties of cultural and traditional significance to Tribes. This needs to be included and discussed as the potential exists for numerous sites to be disturbed or destroyed by this proposed undertaking. While the current study addresses only the existing sites it does not address unrecorded or unidentified sites except in terms of a probability model. Probability models do not and cannot account for tribally significant sites as they do not fit into the limited parameters used within the probability models to identify areas of potential. The THPO does not agree with probability models which are used to eliminate or minimize areas from identification efforts for historic properties.

Please feel free to contact the THPO at [redacted] if you have any questions. Email is our preferred method of communications.

Please refer to THPO file number 2019-001 in all correspondence for this undertaking.

Sincerely,

[redacted]
Thlopthlocco Tribal Town
Tribal Historic Preservation Officer

FIELDS | Estate of Bert Fields, Jr.
Fields Oil & Gas Company LLC
Fields Cattle Company LLC

Michael P. Haggerty
[redacted]

February 21, 2019

Via FedEx

Ms. Kate Zielke
Senior Transportation Planner
Environmental Coordination/Environmental Justice
North Texas Council of Governments
Centerpoint II
616 Six Flags Drive
Arlington, Texas 76011

Re: Denton Greenbelt Corridor Feasibility Study

Dear Ms. Zielke:

On behalf of the Estate of Bert Fields Jr. (the "Estate"), I would like to provide you input on the referenced study being prepared by the NTCOG. The Estate owns approximately 2,500 acres located on the west side of FM 1385 at the intersection of FM 428. The subject parcel is bisected by the existing FM 428 and traverses all the way to FM 2931. This parcel is affected by the Study's two alternative alignments as shown on Figure A-1 of your draft report. Please be advised that the Estate **only supports Alignment 1** as it traverses through its property. Alignment 1 is consistent with the City of Aubrey's and Denton County's thoroughfare plans. Your Alignment 2 adversely impacts the subject parcel and could greatly compromise the overall value of this property.

In review of your draft report, it is our understanding that the NTCOG is recommending a reduced number of lanes from US 377 to the west. It is also our understanding that this reduced section is being driven by current potential restrictions at the BNRR crossing and the crossing of the Trinity River. We strongly encourage the NTCOG and other participating regulatory agencies to pursue all reasonable efforts to eliminate those restrictions and provide for adequate traffic lanes that will be needed to support the continued population growth of both Denton and Collin Counties, and highways. The lane capacities in that section should be consistent with the entire Denton and Collin County corridors for this proposed multimodal highway facility.

The Estate and its predecessors have a long history of working with the City of Frisco on the expansion and extension of the Dallas North Tollway and the Estate is currently working with Collin County on the alignments and ROW dedication for the Collin County portion of this

same facility as it bisects other properties owned by the Estate. We hope that we can continue those same efforts on this portion of the Denton Greenbelt Corridor as it progresses.

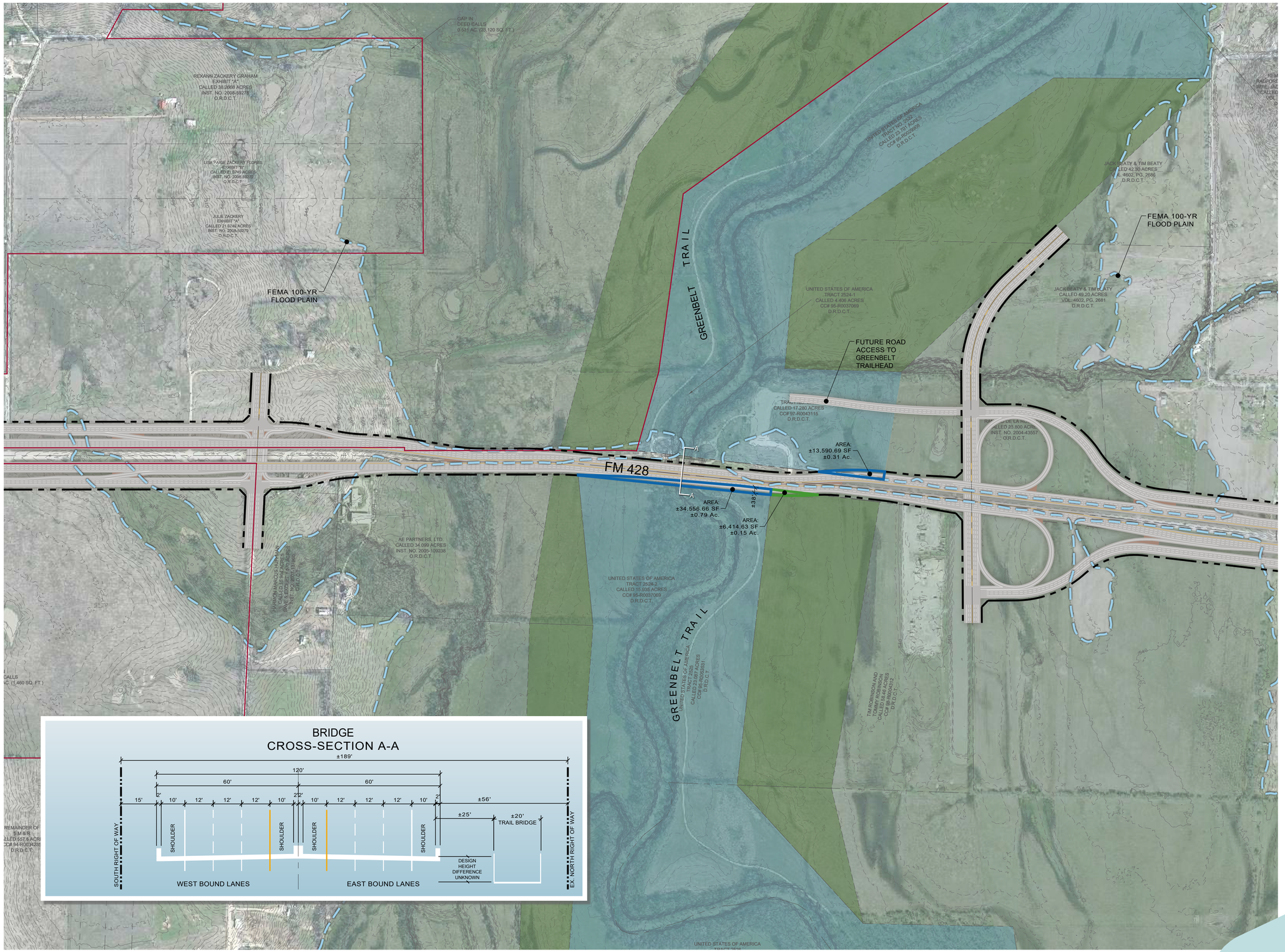
Thank you very much for the NTCOG's efforts to push this project along. We appreciate your time and consideration on this very important matter.

Very truly yours,

Michael P. Haggerty
Independent Executor

MPH:ne

cc: Frank Abbott
Ryan Haggerty



GRAPHIC SCALE IN FEET
0 150 300 600
1"=300' @ 22x34

LEGEND

- CONSERVATION EASEMENT
- USA PROPERTIES

NOTE:
THIS EXHIBIT SHALL NOT BE CONSIDERED A SCHEMATIC. AREAS AND DISTANCES ARE SUBJECT TO CHANGE BASED ON FINAL SCHEMATIC DESIGN.

OPTION:
6 LANES UNDIVIDED AT BRIDGE

DENTON COUNTY

Greenway Parkway Corridor

FM 428 AT TRINITY CROSSING

Denton County, Texas
January 2019

Kimley»Horn
5750 Genesis Court
Suite 200
Frisco, Texas 75034
972-335-3580
State of Texas Registration No. F-928

NOTE: THIS PLAN IS CONCEPTUAL IN NATURE AND HAS BEEN PRODUCED WITHOUT THE BENEFIT OF A SURVEY, TOPOGRAPHY, UTILITIES, CONTACT WITH THE CITY, ETC.

DWG NAME K:\FRI_CIVIL\64448100-VENABLE RANCH\DWG\EXHIBITS\HIGHWAY SCHEMATIC\PLAN SHEETS\64448100-HIGHWAY SCHEMATIC-190107.DWG
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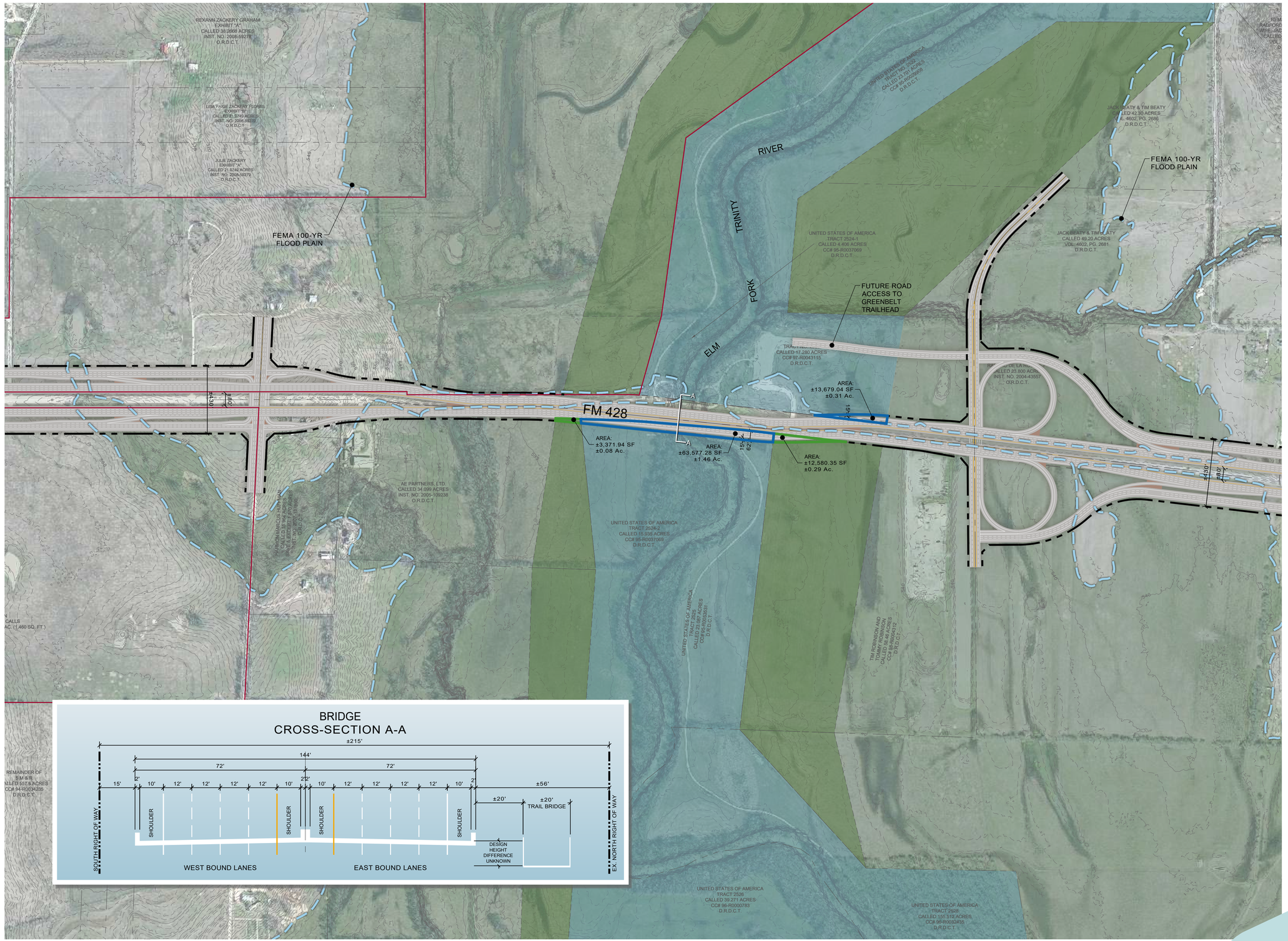

BRIDGE
CROSS-SECTION A-A

GRAPHIC SCALE IN FEET
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1"=300' @ 22x34

LEGEND

- CONSERVATION EASEMENT
- USA PROPERTIES

NOTE:
THIS EXHIBIT SHALL NOT BE CONSIDERED A SCHEMATIC. AREAS AND DISTANCES ARE SUBJECT TO CHANGE BASED ON FINAL SCHEMATIC DESIGN.

OPTION:
8 LANES UNDIVIDED AT BRIDGE

DENTON COUNTY

Greenway Parkway Corridor

FM 428 AT TRINITY CROSSING

Denton County, Texas
January 2019

Kimley»Horn
5750 Genesis Court
Suite 200
Frisco, Texas 75034
972-335-3580
State of Texas Registration No. F-928

NOTE: THIS PLAN IS CONCEPTUAL IN NATURE AND HAS BEEN PRODUCED WITHOUT THE BENEFIT OF A SURVEY, TOPOGRAPHY, UTILITIES, CONTACT WITH THE CITY, ETC.

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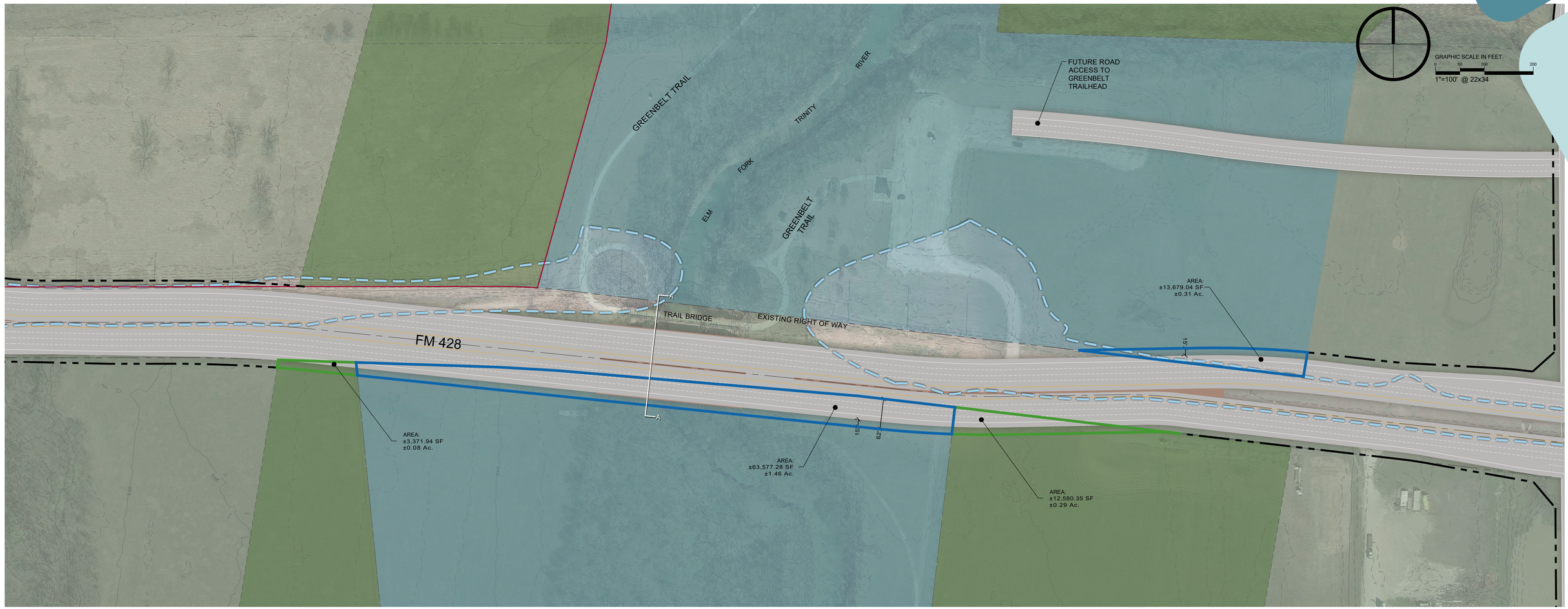

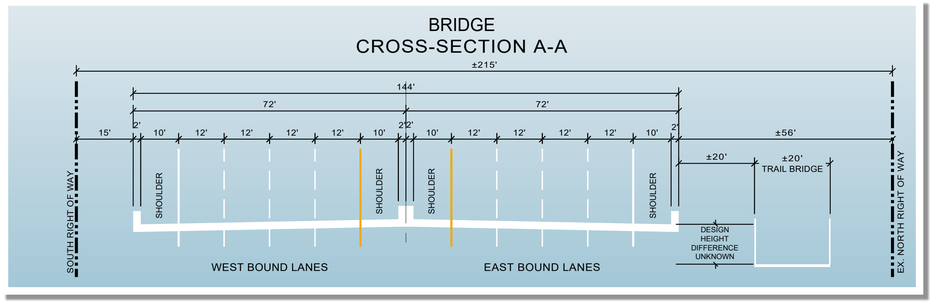

LEGEND

- CONSERVATION EASEMENT
- USA PROPERTIES

NOTE:
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OPTION:
VIEW 2 OF 8 LANES UNDIVIDED AT BRIDGE

DENTON COUNTY

Greenway Parkway Corridor

FM 428 AT TRINITY CROSSING

Denton County, Texas
January 2019

Kimley»Horn
5750 Genesis Court
Suite 200
Frisco, Texas 75034
972-335-3580
State of Texas Registration No. F-928

DWG NAME K:\FRI_CIVIL\64448100-VENABLE RANCH\DWG\EXHIBITS\HIGHWAY SCHEMATIC\PLAN SHEETS\064448100-HIGHWAY SCHEMATIC-190107.DWG
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GRAPHIC SCALE IN FEET
0 150 300 600
1"=300' @ 22x34

LEGEND

CONSERVATION EASEMENT

USA PROPERTIES

NOTE:
THIS EXHIBIT SHALL NOT BE CONSIDERED A SCHEMATIC. AREAS AND DISTANCES ARE SUBJECT TO CHANGE BASED ON FINAL SCHEMATIC DESIGN.

OPTION:
8 LANES UNDIVIDED WITH FULL MEDIAN

DENTON COUNTY

Greenway Parkway Corridor

FM 428 AT TRINITY CROSSING

Denton County, Texas
January 2019

Kimley»Horn
5750 Genesis Court
Suite 200
Frisco, Texas 75034
972-335-3580
State of Texas Registration No. F-928

NOTE: THIS PLAN IS CONCEPTUAL IN NATURE AND HAS BEEN PRODUCED WITHOUT THE BENEFIT OF A SURVEY, TOPOGRAPHY, UTILITIES, CONTACT WITH THE CITY, ETC.

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February 20, 2019

Kate Zielke
North Central Texas Council of Governments
616 Six Flags Dr.
Centerpoint Two
Arlington, TX 76011

RE: Denton Greenbelt Corridor Feasibility Study

Dear Kate,

On behalf of Venable Ranch, I want to inform you that our preferred alignment for the Outer Loop is Alignment 1 between the Collin County line up to the Trinity River and then Alignment 2 going west from the Trinity River. Here are the main reasons:

1. This alignment is consistent with our current and ongoing master plan for development.
2. This alignment is consistent with our agreement with Aubrey.
3. This alignment is consistent with Aubrey and Denton County's thoroughfare plans.

We are opposed to Alignment 2 between the Collin County line and the Trinity River. This alignment would adversely impact our ranch, ongoing planning and ultimately the value of the property. We would support Alignment 2 west of the Trinity.

Also, we object to the current four-lane proposal west of 377 at the BNRR and Trinity River crossings. The traffic bottleneck that would quickly result from the continued rapid growth in Denton and Collin Counties could be avoided. The cost increase should not be prohibitive because much of the corridor is already envisioned as six lanes. The lanes should be consistent throughout the balance of the corridor. Thus, we strongly encourage NCTCOG and other participating agencies to pursue all efforts to permit and build a minimum six-lane freeway for the proposed Greenbelt Corridor.

If you need additional information, you may reach me by e-mail at [redacted] or by phone at [redacted] Thank you in advance for taking our preference into consideration.

Best Regards,

Wes Tydlaska

Wes Tydlaska

Oral Comments Received during December 2018-January 2019 Comment Period

Commenter	Comment	Response
Comments Related to Roadway		
Multiple Commenters	Support was expressed for additional general-purpose lanes where FM 428 crosses the Denton Greenbelt. These lanes would address increasing traffic and prevent congestion at the entrance to the FM 428 trailhead of Ray Roberts Lake State Park. Because limited possibilities exist for transportation infrastructure to cross the Denton Greenbelt, this corridor should provide appropriate capacity at initial construction.	This consideration has been added to the Next Steps chapter.
Multiple Commenters	Support was provided for acquiring right-of-way in the conservation easement if this increased safety and efficient access to the park. It was noted that mitigation, permission from the Secretary of the Army, or federal legislation may be required.	Considerations seeking engineering and design solutions to increase the number of main lanes in the Denton Greenbelt crossing have been added to the Next Steps chapter.
Multiple Commenters	Roadway access to the park must allow for safe acceleration and deceleration of horse trailers and large trucks, especially in light of expected increases in traffic.	Section 7.3.3.6 addresses this concern.
Multiple Commenters	Referencing the concept map proposing cloverleaf access to the park, it was asked whether this design could be modified to allow safe acceleration and deceleration for horse trailers while reducing the space taken by the infrastructure. An overpass, possibly at the intersection of FM 428, Black Jack Road, and Wildcat Road, could allow horse trailers access to the trailhead parking lot via a frontage road.	Design decisions will be made by the implementing agency during future phases of the project, including the location and possible configuration of the intersection. For reference, the TxDOT Roadway Design Manual (2018) states that cloverleaf interchanges may be appropriate in *non-urbanizing areas*. The manual also notes that a primary disadvantage of cloverleaf interchanges is trucks' difficulty with weaves and acceleration.
Frank Abbott, Kimley-Horn	A request was made to plan a project footprint large enough to accommodate the potential for more lanes for phased construction.	The study focuses on the horizon planning year of 2045 because that is the best available traffic data. That data corresponds with the recommendations in the feasibility study. This study cannot recommend lanes beyond those identified by the horizon year of traffic data.

Commenter	Comment	Response
Frank Abbott, Kimley-Horn	It was requested that frontage roads be included at the railroad crossing at US 377 and the economic and congestion benefits of including frontage roads at this location be considered.	This consideration has been added to the Next Steps chapter.
Blake Alldredge, Upper Trinity Regional Water District	Support was voiced for treatment of stormwater from the proposed facilities. It was requested that the maintenance responsibility of this system should be identified in advance.	The jurisdiction that owns the roadway right-of-way would be responsible for maintaining stormwater facilities within their jurisdiction. For example, TxDOT would be responsible for maintaining stormwater facilities in TxDOT-owned right-of-way.
Janet Meyers, Mayor, City of Aubrey	The city of Aubrey supports the southern alignment and eight main lanes to prevent congestion.	The Next Steps chapter now includes a recommendation that implementing partners consider design and engineering solutions to increase the number of main lanes from US 377 west to IH 35 and include frontage roads at the corridor's intersection with US 377 and the Union Pacific railroad crossing. This chapter also now calls for future studies to consider the described alignment.
Janet Meyers, Mayor, City of Aubrey	It was noted that the corridor should include a connection at US 377, because this is crucial for commercial access to the city and for the Aubrey Independent School District.	This consideration has been added to the Next Steps chapter.
Jeff M. Miller, City of Aubrey	Bicycle safety concerns were expressed due to the lack of frontage roads at the Denton Greenbelt.	Texas Department of Transportation is required to address bicycle and pedestrian connections in future studies for this project.
Curtis Petersen, USAGE	Safety concerns were expressed about lane restrictions at the Denton Greenbelt crossing in light of agricultural equipment's use of the roadway.	This consideration has been added to the Next Steps chapter.
Curtis Petersen, USAGE	It was asked why planning was limited to the year 2045.	The planning horizon matches that of the region's current metropolitan transportation plan, *Mobility 2045*, and the feasibility study uses data from that plan. The implementing agency may choose a different planning horizon for future studies.

Commenter	Comment	Response
Richard Rogers, Greenbelt Alliance	Support was given to recommendations made in the study, including naming the roadway Greenbelt Parkway or similar and using landscaping and aesthetic elements to integrate the road with the community.	As noted by the commenter, the study calls for the use of context sensitive solutions at the Denton Greenbelt crossing.
Comments Related to Transit		
Ann Boulden, Denton County Transportation Authority	An east-west transit connection will be needed in the future along either FM 428 or US 380. This should be considered as planning for the Denton Greenbelt Corridor progresses.	This consideration has been added to the Next Steps chapter.
Comments Related to Shared-Use Paths		
Linda Moore, Lake Ray Roberts Equestrian Trails Association	It was requested that the word “equestrian” be added to the bicycle-pedestrian section.	This reference has been added to the Transportation System chapter.
Tracy Matern, Lake Ray Roberts Equestrian Trails Association, Trinity Trail Preservation Association, Texas Equestrian Trail Riders Association	A request was made that trail access under the roadway be included in the study.	This consideration has been added to the Next Steps chapter.
Linda Moore, Lake Ray Roberts Equestrian Trails Association	When planning for trails in the corridor, separate and wider trails should be considered for bikes vs. pedestrians and equestrians. Bicyclists travel at a different speed than pedestrians and equestrians and different surface types are required.	This consideration has been added to the Next Steps chapter.

Commenter	Comment	Response
Linda Moore, Lake Ray Roberts Equestrian Trails Association	A two-lane trail connecting the Denton Greenbelt to the city of Aubrey should be considered.	NCTCOG will consider adding such a trail to its Regional Veloweb, a network of existing and planned shared-use paths in North Central Texas. The Downtown Aubrey Master Plan Report (2015) identifies a proposed multiuse trail for bicyclists, pedestrians, and equestrians along Sherman Road/FM 428 or a parallel facility to connect downtown and Aubrey Middle School.
Park Impact-Related Comments		
Multiple Commenters	The following park improvements were suggested to accommodate future increased visitation: • Providing a larger parking lot with pull-in and pull-out parking stalls to accommodate large trucks and horse trailers • Adding FM 428 trailhead safety features including lighting, a manned booth, and/or a security system • Addressing sections of the trail that are most likely to erode due to rain and flood events • Rerouting trails or creating an elevated walkway in areas where horses may get stuck due to boggy conditions • Providing a ramp instead of steps for canoe access • Upgrading bathroom facilities, lighting, landscaping, and picnic areas • Planting trees within the park to function as sound mitigation; plantings should occur well in advance of construction to allow the trees to grow • Preventing utility powerlines that would diminish the visual appeal of the park	Because the parking lot and other features are on the park property, federal transportation funds may not be able to be used to upgrade the parking lot and/or add security features. But Section 4(f) mitigation funds may be a source of funding for this work. Texas Parks & Wildlife Department and the US Army Corps of Engineers will work to develop a mitigation plan.

Commenter	Comment	Response
Multiple Commenters	Support was expressed for a wildlife overpass or underpass where FM 428 crosses the Denton Greenbelt; the passage also could serve recreational users. It was noted that an overpass could provide acreage back to the park and result in less noise and mud than an underpass. Wildlife passages should be considered both east and west of the river.	This consideration has been added to the Next Steps chapter.
Dr. Ken Dickson, Greenbelt Alliance	Concern was expressed about effects the new corridor may have on ecological aspects of the park; the value of wildlife to people who visit the park was noted.	During future environmental studies for this project, a detailed biological assessment will occur, including field investigations. Impacts to wildlife will be addressed and potentially mitigated for.
Carol Nichols	Planning must prevent the park from being destroyed by the road.	Section 7.3 of the Next Steps chapter states that both alignments may require a site-specific ecological assessment during the National Environmental Policy Act process because of their proximity to the state park. As required by Section 4(f) of the US Department of Transportation Act of 1966, efforts must be made to entirely avoid the state park, or, if avoidance is not possible, to minimize impacts to the park. After minimization efforts have been incorporated, mitigation measures should be developed with Texas Parks & Wildlife Department and the US Army Corps of Engineers.
Richard Rogers, Greenbelt Alliance	The roadway expansion should not provide an opportunity for utilities to be carried through the Denton Greenbelt.	This consideration has been added to the Next Steps chapter. Any utilities outside of TxDOT right-of-way are beyond the scope of the feasibility study.
Richard Rogers, Greenbelt Alliance	Future generations' ability to enjoy the park is important, and this may require an investment in maintenance. Flooding has closed the trailhead at US 380 for much of the past five to seven years, and only half the trails have been open continuously since the park's inception.	Any impacts to floodplain areas would be regulated and mitigated. Coordination with the Federal Emergency Management Administration and local floodplain administrators would occur. Texas Parks & Wildlife Department and the US Army Corps of Engineers may be able to use any Section 4(f) mitigation funds to incorporate design features where necessary.

Commenter	Comment	Response
Richard Rogers	The history behind the creation of the park was described. The natural and scenic qualities of the park and the historic bridge were noted as being important to the community and future generations.	Comment noted.

Written Comments Submitted by Email or Letter

Commenter	Comment	Response
Comments Related to Tribal Nation Interests		
Kiowa Tribe of Oklahoma	The proposal project location should have minimal potential to adversely affect any known Archaeological, Historical, or Sacred Kiowa sites. Should undiscovered properties be encountered, they should be immediately reported to the Kiowa Tribe Office of Historic Preservation.	The Next Steps chapter now recommends implementing agencies keep tribal nations, including the Kiowa Tribe of Oklahoma, involved as a stakeholder during future phases of project development. This shall include immediately reporting any encounters with undiscovered properties to the Kiowa Tribe of Oklahoma and other tribes with interest in the region.
Muscogee (Creek) Nation	Denton County is not currently in Muscogee (Creek) Nation's Area of Interest but can be incorporated into the Area of Interest if new records or cultural resources are discovered. Some sections of the studied alignment areas have been subjected to a Phase I intensive cultural resources survey, but the majority of the alignment areas have not. The survey report should be provided to the Muscogee (Creek) Nation for review to ensure that cultural resources are not needlessly being impacted. Muscogee (Creek) Nation is pleased to see the studied alignments use the existing crossing of the Denton Greenbelt because there are known archaeological resources in that area. The Muscogee (Creek) Nation is currently unaware of any Muscogee cultural sites within the Area of Potential Effects of the proposed project.	The Next Steps chapter now recommends implementing agencies keep tribal nations, including the Muscogee (Creek) Nation, involved as a stakeholder during future phases of project development. This shall include providing the cultural resources survey report to tribal nations for review.

Commenter	Comment	Response
Thlopthlocco Tribal Town Tribal Historic Preservation Office	Thlopthlocco Tribal Town would like to remain a consulting party for the duration of the Denton Greenbelt Corridor undertaking. Implementation of regulations of the National Historic Preservation Act need to be addressed, including unrecorded or unidentified sites. A probability model cannot account for tribally significant sites and should not be used to eliminate or minimize areas from identification efforts or historic properties.	The requested on-site field investigations will be completed during the National Environmental Policy Act environmental process for the corridor. To promote the use of field investigations, the Next Steps chapter now calls for pedestrian surveys and on-site field investigations to be performed as the main source for cultural resource identification and locations in lieu of relying on probability models to locate cultural resources.
Comments Related to Landowner Interests		
Estate of Bert Fields, Jr.	The Estate only supports Alignment 1 as it traverses the Estate's property on the west side of FM 1385 at the intersection of FM 428. We encourage efforts to provide adequate traffic lanes to support population growth by eliminating potential restrictions at the railroad crossing and crossing of the Trinity River.	The Next Steps chapter now includes a recommendation that implementing partners consider design and engineering solutions to increase the number of main lanes from US 377 west to IH 35 and include frontage roads at the corridor's intersection with US 377 and the Union Pacific railroad crossing.
Kimley-Horn on behalf of Venable Ranch and Associates	A concept map designed by Kimley-Horn illustrates a possible cloverleaf interchange to allow safe ingress and egress for horse trailers and other vehicles into the Ray Roberts Lake State Park trailhead at FM 428. Additional concept maps illustrate possible expansions of FM 428 in the Denton Greenbelt crossing that include six or eight main lanes. Estimates are provided for the acreage of land owned by the US Army Corps of Engineers or held under conservation easement that would need to be acquired for right-of-way to accommodate these lanes.	The provided concept maps are included in the Stakeholder Engagement appendix. The Next Steps chapter calls for future studies to consider engineering and design solutions to allow for safe acceleration and deceleration of horse trailers and access to the park. Additionally, the Next Steps chapter now includes a recommendation that implementing partners consider design and engineering solutions to increase the number of main lanes from US 377 west to IH 35.

Commenter	Comment	Response
Wes Tydlaska on behalf of Venable Ranch	Venable Ranch's preferred alignment follows the path of Alignment 1 from Collin County to the Trinity River and follows Alignment 2 from the Trinity River to IH 35. This alignment is preferred because it is consistent with the Venable Ranch master plan for development, the Venable Ranch agreement with the city of Aubrey, and the city of Aubrey and Denton County master thoroughfare plans. Venable Ranch is opposed to Alignment 2 from Collin County to the Trinity River. Venable Ranch objects to the recommendation for four lanes from US 377 through the Trinity River and IH 35. Venable Ranch encourages efforts to permit and build a six-lane freeway for the Denton Greenbelt Corridor.	The Next Steps chapter now calls for future studies to consider the described alignment.